OCT 2 1 1943

AUTOMOTIVE and Aviation INDUSTRIES

OCTOBER 15, 1943

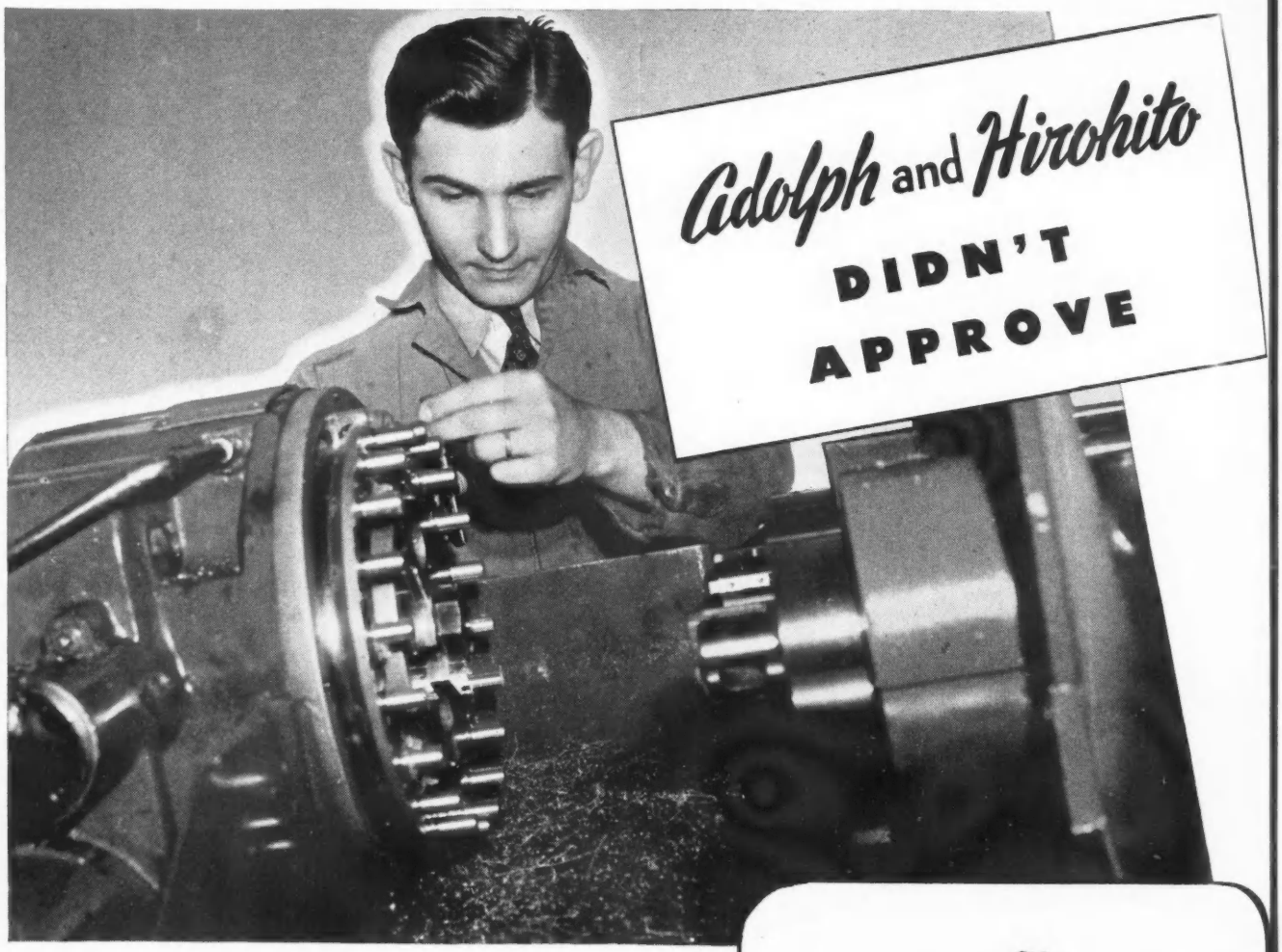
Timken's new series of LIGHT and EXTRA-LIGHT Bearings for Aircraft

The bearings shown here have been reduced to approximately half size. For detailed drawings write The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



That didn't matter — because the aircraft manufacturer did, when HEALD ENGINEERING solved their problem so satisfactorily that with two Bore-Matics they replaced 11 drill presses, a rough grinding operation, and saved 27 men a day and 8 times Bore-Matic cost.

THE PROBLEM, put briefly, lay in finishing the O. D. and faces of 20 trunnions on reduction gear carriers. Spacing to .0005" was required. Faces had to be square. Originally trunnion O. D.'s were ground at the rate of one part per hour —way below desired production. And faces were finished on single spindle drill presses — again slow and inaccurate, too.

THE SOLUTION — by HEALD ENGINEERING — was Heald Bore-Matics precisioneered for the job. True O. D.'s and perfect squareness were obtained by finishing trunnions and faces in the same operation by single point tools . . . accurate fixture indexing permitted "tenth" spacing by finishing all 20 trunnions in one cycle . . . double spindles for finishing two trunnions simultaneously plus an automatic cycle with automatic indexing resulted in a tremendous production increase over former methods.

Have you a wartime problem or do you need assistance in postwar planning? If it involves precision finishing, HEALD ENGINEERING is available, now, to help you.

The HEALD Machine Co., Worcester, Mass., U. S. A.

HOW HEALD ENGINEERING SOLVED A WARTIME PROBLEM

and Saved

11 DRILL PRESSES
27 MEN A DAY
8 TIMES BORE-MATIC COST AND ROUGH GRINDING OPERATIONS

In Finishing Aircraft Reduction Gear Carriers with two HEALD BORE-MATICS

For More Precision Faster, bring your problems to Heald

AUTOMOTIVE and Aviation INDUSTRIES

Published Semi-Monthly

Vol. 89 October 15, 1943 Number 8

JULIAN CHASE, Directing Editor

J. R. CUSTER, Associate Editor
JOS. GESCHELIN, Detroit Editor
JEROME H. FARRIS, Ass't Editor
E. L. WARNER, JR., Associate Editor
MARCUS AINSWORTH, Statistician
H. H. ROBERTS, Ass't Editor
L. W. MOFFETT, Washington News Ed.
HOWARD KOHLBRENNER, Art Editor
R. RAYMOND KAY, West Coast
J. DONALD BROWNE, Washington News Ed.
MARCUS W. BOURDON, British

CONTENTS

Engineering BDV Production of Flying Fortresses. *By Mac Short* 17

Corcoran-Brown Now Producing Steel Cartridge Cases in Large Quantities. *By Joseph Geschelin* 22

How Good Are Synthetic Rubber Tires? *By E. L. Warner, Jr.* 26

Some Features of the DB-601 Liquid-Cooled Aircraft Engine. *By M. W. Bourdon* ... 28

Injection Pump Test Stand. *By P. H. Schweitzer* 32

Short Cuts 34

National Metal Congress and War Conference Display 36

Impact Extrusion and Cold Pressing of Aluminum Parts. *By Phil Koenig* 38

Production Equipment 42

Airbriefs 44

New Products for Aircraft 46

News of the Industry 48

New Products 60

Calendar of Coming Events 72

Advertisers' Index 160-161

Automotive Division
Jos. S. HILDRETH, President and Manager
JULIAN CHASE, Vice Pres. **G. C. BUZBY, Vice Pres.**

OFFICES

Philadelphia 39, Pa., Chestnut & 56th Sts., Phone Sherwood 1424
New York 17, N. Y., 100 East 42nd St., Phone Murray Hill 5-8600; Chicago 1, Ill., Room 916 London Guarantee & Accident Building, Phone Franklin 4243; Detroit 2, Mich., 1015 Stephenson Bldg., Phone Madison 2090; Cleveland 14, Ohio, 609 Guardian Bldg., Phone Cherry 4188; Washington 4, D. C., 1061 National Press Bldg., Phone District 6877; San Francisco 5, Calif., 605 Market St., Room 708, Phone Douglas 0967; Los Angeles 1, Calif., 6060 Miramonte Blvd., Phone Lafayette 5525.

Cable Address ..... Autoland, Philadelphia

Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

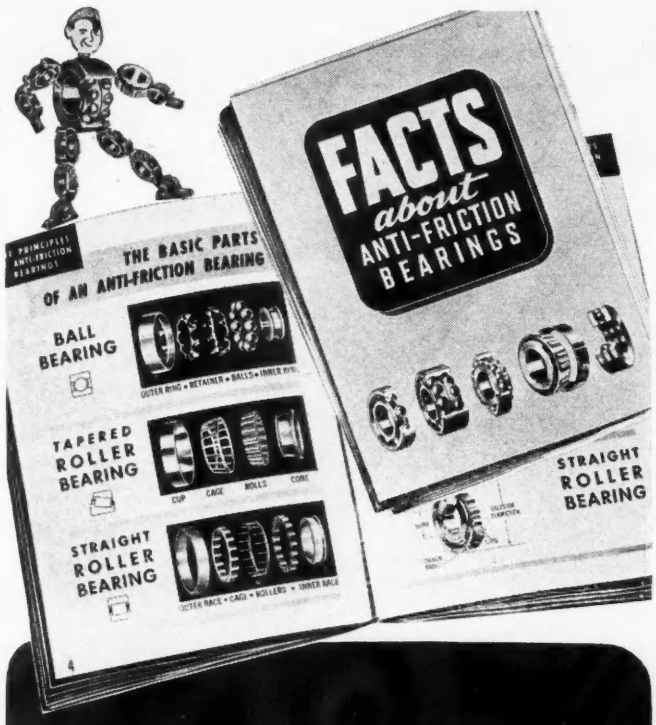
AUTOMOTIVE and AVIATION INDUSTRIES is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

Owned and Published by
CHILTON COMPANY
(Incorporated)

Executive Offices
Chestnut and 56th Streets, Philadelphia 39, Pa., U. S. A.

Officers and Directors
C. A. MUSSELMAN, President
Vice-Presidents

JOS. S. HILDRETH — GEORGE H. GRIFFITHS
EVERIT B. TERHUNE — J. H. VAN DEVENTER — C. S. BAUR
WILLIAM A. BARBER, *Treasurer* — JOHN BLAIR MOFFETT, *Secretary*
JULIAN CHASE — THOMAS L. KANE — G. C. BUZBY
P. M. FAHRENDORF — HARRY V. DUFFY — CHARLES J. HEALE



Facts about

ANTI-FRICTION BEARINGS

Anybody who reads this handy little volume will have a clearer understanding of what bearings do, how they function, all their different types, and how they are applied.

It is "MUST" reading for those who have anything to do with selecting, using or servicing bearings. No "selling" in it—just 32 pages of simple common sense, with more than a hundred helpful diagrams, phantom drawings and photographs. Handy pocket size.

A copy will be sent on request.

AHLBERG BEARING COMPANY
Manufacturers of (CJB) Master Ball Bearings
3002 W. 47th St., Chicago, Ill.

AUTOMOTIVE *and* AVIATION INDUSTRIES. Vol. 89, No. 8. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, United States Possessions, and all Latin-American countries, $1.00 per year. Canadian and Foreign $2.00 per year; single copies, 25 cents, except Statistical Issue (Mar. 15, 1943), 50 cents.

THE "DUCKS" DO THEIR PART

Materials must go through—in spite of rivers, lakes or ocean stretches. Victor Sealing Products—gaskets, oil seals and grease retainers—protect the power that drives the "Ducks" (amphibious cargo trucks) on land or water. Victor Manufacturing and Gasket Co., P. O. Box 1333, Chicago, Ill., U. S. A.

VICTOR

GASKETS · · OIL SEALS

IN THIS ISSUE . . .

AUTOMOTIVE and AVIATION INDUSTRIES

Volume 89 October 15, 1943 No. 8

Engineering Production of Flying Fortresses 17
With the big jump that took place in the production of Boeing B-17's was the cooperation of three separate organizations. The story of what they did for one another toward the end of more production is a story of real history making importance.

Steel Cartridge Cases in Large Quantities 22
This is an account of the highly specialized talents and experience of the Corcoran-Brown organization adapting their facilities to war production in a big way.

How Good Are Synthetic Rubber Tires? 26
Here is the story of what is being done to take the place of natural rubber in the manufacture of tires for both passenger and commercial vehicles. What has been done and accomplished and the relative values as determined by the test fleets of the Office of Rubber Director and the Rubber Manufacturers Association is told in detail.

The DB-601 Aircraft Engine 28
This German engine has a number of distinctive features that are of considerable interest. Here is a description of it liberally augmented with drawings.

Extrusion and Cold Pressing of Aluminum Parts 38
Aluminum and aluminum alloys can be processed by the impact-extrusion method. Not only can this be accomplished economically and efficiently but with a very material increase in production over some other methods used in the manufacture of many of the smaller parts for airplane assembly.

National Metal Congress 36
Three technical societies are cooperating in this event October 16-22. The range of subjects in the metallurgical field covers everything from alpha to omega. The complete programs with a list of the papers are included in this article.

AUTOMOTIVE INDUSTRIES
Reg. U. S. Pat. Off.

Shortage of Cords May Retard Tire Program

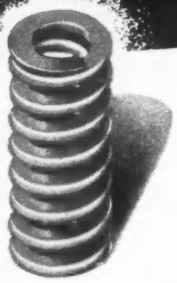
A serious shortage of rayon tire cord may retard next year's tire program. Testimony to this effect was given on Sept. 22 to the Senate Truman Committee by James A. Jacobson, Special Assistant to Donald M. Nelson, WPB Chairman and H. Leroy Whitney, Technical Consultant to Mr. Nelson.

Rubber Director Bradley Dewey has submitted a program for 1944 for approximately 52,000,000 tires. Of this number, more than 15,000,000 call for rayon cord, requiring 206,000,000 lb. and more than 37,000,000 call for cotton cord, requiring 210,000,000 lb.

Existing and authorized facilities for rayon cord, it is expected, will produce about 124,000,000 lb. next year. Included in the 206,000,000 lb. estimate are approximately 42,000,000 lb. of rayon cord for tires which the military said would be adequate if produced of cotton cord. Deducting this from 206,000,000 lb. left a net requirement of about 164,000,000 lb. of rayon cord and a deficit of some 40,000,000 lb.

Make Every Pay Day
"BOND DAY"
Get back of the Pay-Roll Savings Plan by encouraging employees to turn part of their earnings *regularly* into tanks and planes and guns through systematic purchase of
U. S. WAR BONDS

1,000,000 TINY HAMMERS ADD TO LIFE OF SPRINGS!



A MILLION tiny pellets—hurtling with incredible speed and striking from every angle—beat a toughening tattoo upon the Muehlhausen Springs inside this huge shot blaster. This hammering "work hardens" the surface to boost the endurance limit of the spring.

Shot blasting also lengthens spring life by smoothing out microscopic "hills and valleys", and thus prevents early failure from stress concentrations at these points.

The superficial results of this process can be seen with the naked eye—for a clean, lustrous finish is produced. But the more important results show up, only after years of service, in the lasting efficiency of Muehlhausen Springs.

MUEHLHAUSEN SPRING CORPORATION
Division of Standard Steel Spring Company
650 Michigan Avenue, Logansport, Indiana

MUEHLHAUSEN SPRINGS

EVERY TYPE AND SIZE

TWO NEW FOLDERS — FREE

Die Spring Bulletin illustrates, describes 206 sizes and types of die springs.

Armament Bulletin shows importance of springs for many types of war material.

AUTOMOTIVE and AVIATION INDUSTRIES

Published on the 1st and 15th of the month

Volume 89, No. 8
October 15, 1943

Engineering BDV Production of Flying Fortresses

By Mac Short
Vice President-Engineering, Vega Aircraft Corp., and President of the Society of Automotive Engineers

NEWSPAPER headlines chronicling the successful Flying Fortress bombing raids around the globe are everyday events to the American public. But not so familiar are the technical aspects of the Boeing-Douglas-Vega production program which has swiftly produced these great airplanes in sufficient numbers to take drastic toll of the Axis.

Early in 1941, by Presidential request, a program was put into effect for increasing the production of heavy bombers. A part of this program was that of applying the manufacturing facilities of the Douglas Aircraft Co. and Vega Aircraft Corp. to the construction of Boeing B-17's. An enterprise of such proportions and complexity naturally brought with it many and diverse engineering and manufacturing problems. These problems were successfully pioneered through to solution in the ensuing months by the BDV Committee.

The record herewith, as told by a participating company in the program, reflects the tremendous credit due the Boeing Aircraft Co. for its efforts in making multi-company production of its magnificent design, the B-17F, a living success and a monument to cooperative endeavor in the American free enterprise system.—The Author.

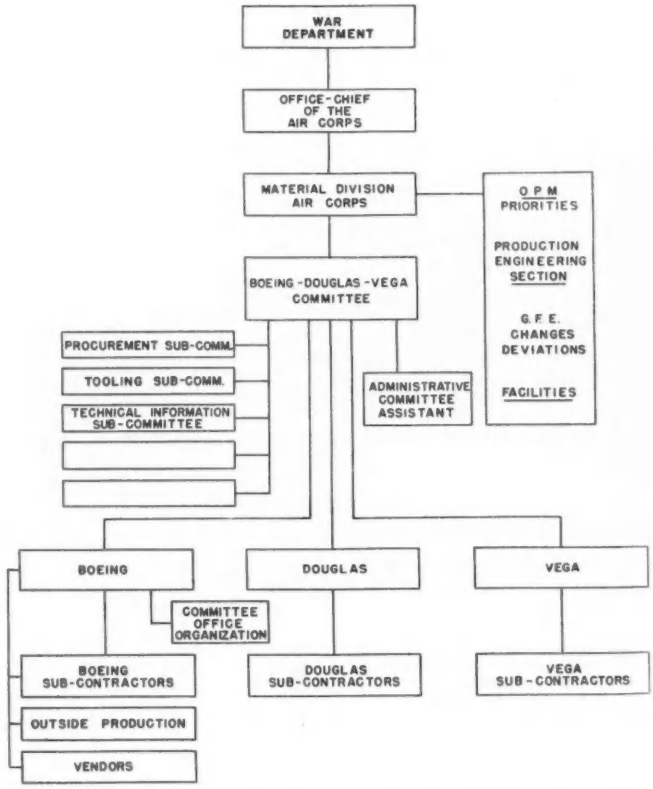
The basic idea for this joint endeavor was conceived by Mr. Johnson, President of the Boeing Aircraft Co., who suggested it to General Arnold, and the working plan for this coordinated effort was conceived by Brigadier General K. B. Wolfe,

who served as Chairman of the BDV Committee. In addition to General Wolfe, the original membership of the Committee consisted of W. E. Beall, chief engineer of Boeing; Fred W. Herman, chief engineer of Douglas, and Mac Short, Vice-President, Engineering, of Vega. This Executive Committee was set up in Seattle at the beginning of the program and was supplemented by subcommittees of engineering, tooling, and procurement specialists from the represented companies.

The Committee met in daily session for the first four months of its operations and at weekly intervals thereafter during its first year. Matters of standing business had been sufficiently cleared up by that time to permit the Committee to meet only on call thereafter.

Results of Committee agreements on matters of policy and procedure were published in BDV Committee bulletins. The 66 such bulletins that have been issued have served as a manual of practice for the program. Other publications included a master delivery schedule for the program, directives authorizing placement of subcontracts with designated subcontractors, recommendations for the allocation of facilities, and authorization for procurement of material and machine tools.

In addition to the standing subcommittees, two additional subcommittees were formed to resolve specific problems. They were the Spares Subcommittee that coordinated the initial spares breakdown for the three companies, and the Service Tool Subcommittee that was formed to coordinate matters pertaining to furnishing of ground handling equipment and special tools.



Channels of communication of original Boeing-Douglas-Vega committee.

At the peak of Committee operations, there were approximately 200 people from Boeing, Douglas, and Vega that were directly involved in the activity centering in the BDV Committee headquarters in the Dexter-Horton building in Seattle. As the first of several coordinating committees that were later set

up to expedite multi-plant production of other basic models, the BDV Committee has set an example and served as a model of intra-company coordination.

At first impression, it would seem that the engineering problem should be very simple. The airplane was already designed and was in production in Seattle. Should it not have been just a matter of taking a set of drawings to California and releasing them to the Vega and Douglas factories to start production of B-17's in that area? In actual experience, it was a very different story.

In the aircraft industry, engineering drawings ordinarily do not present complete and all-inclusive information required to manufacture an airplane. Complementing the drawings are other media for conveying information such as parts lists or part requirement cards, bills of materials, production illustrations, basic dimension layouts, templates, plaster patterns of contour surfaces, and master tooling gages. These and other similar sources of information add up to the body of data required for the production of an airplane.

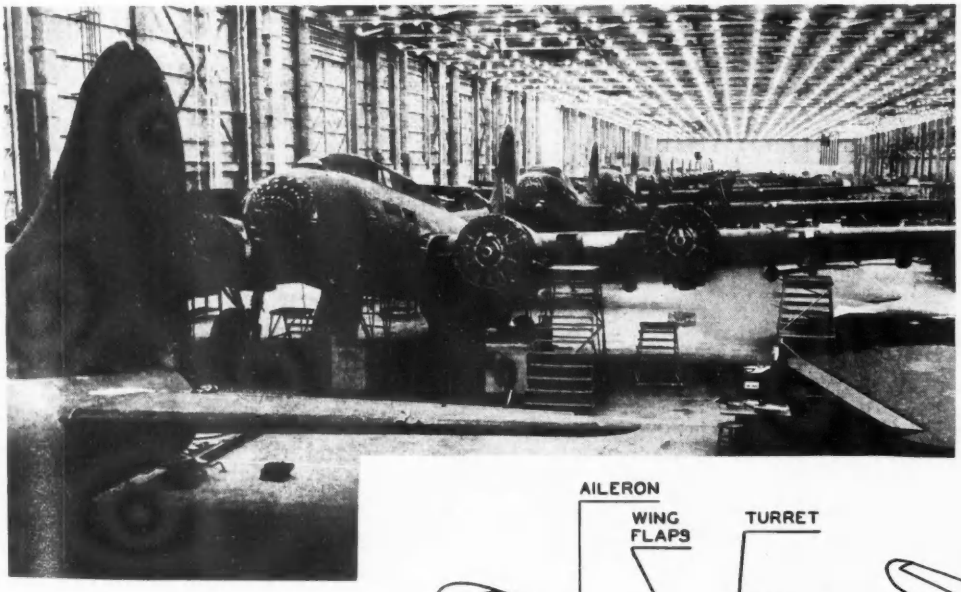
Engineering Data Release

The problem of releasing engineering drawings and part requirement cards was attacked first. It was the desire of the Materiel Center that certain major changes be incorporated in the B-17's to be built under the coordinated program. These included bomb racks of increased capacity, a new camera installation, a new hydraulic system, a change in the material of the rectangular tubing forming the trusswork for the spars and ribs of the wing beams, and numerous other changes of lesser extent.

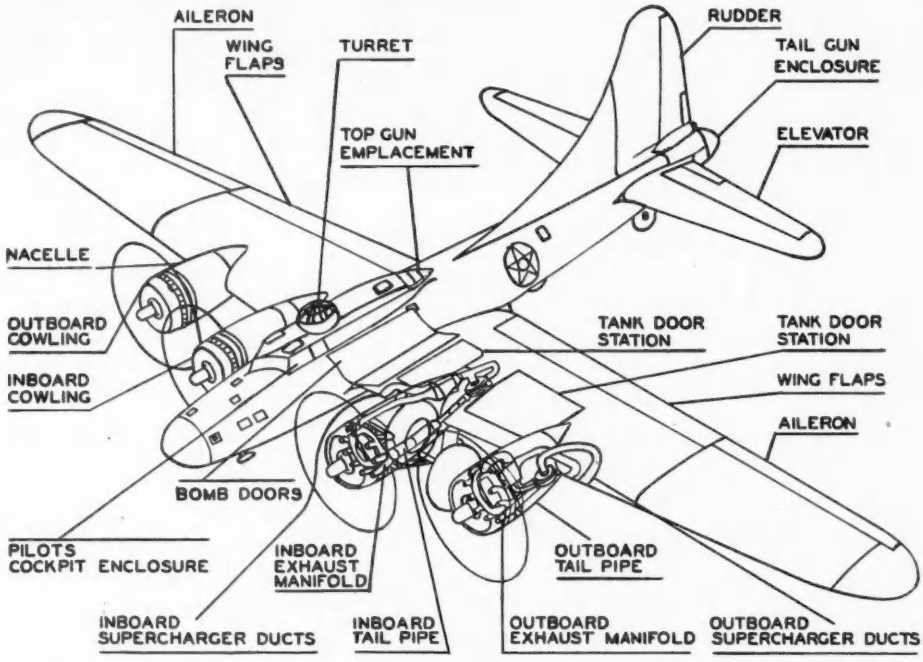
In order to coordinate the release of drawings and specifications, and to simplify accounting, one of the first decisions of the BDV Committee was that the airplanes built under this plan would be known as the B-17F model. The first engineering problem was that of bringing up-to-date the complete set of drawings by incorporating the model revision changes and the outstanding drawing deviations.

To expedite this task and in so doing to become familiar with the Boeing drawing system, approximately 15 engineers from Douglas and from Vega were sent to Seattle to lend a hand to the Boeing Engineering Department. With the experience gained in working with the Boeing drawing system, it was planned that these engineers would return to their factories to become the principal engineering liaison men on the B-17F projects.

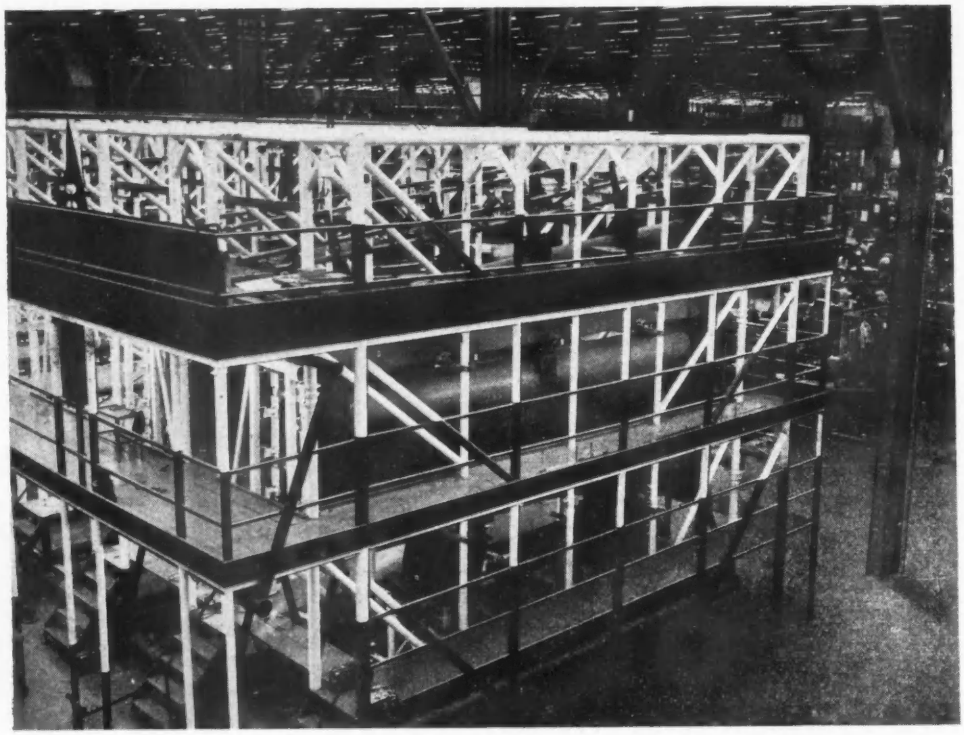
The complete set of approximately 6000 drawings was divided into 18 groups. A schedule was set up for their simultaneous release to the Douglas and Vega companies and to the Boeing production department. By approxi-



(Above) B-17F final assembly line at Long Beach plant of Douglas.



(Right) B-17F components built by major subcontractors of the BDV production program.



Inner wing (B-17F) master gage in wing jig to check control points.

mately four months after the inception of the program, the complete set of drawings was revised for B-17F release and forwarded to the California companies in Van Dyke form.

Concurrently with the release of engineering drawings was the release of part requirement cards. The part requirement card shows the number of times per assembly and per airplane that the part is used and also the developed material size and description. Thus, in the Boeing system the part requirement card comprises the bill of material as well as the data on usage.

Reproduced Tools and Drawings

Revising and bringing up-to-date the tooling drawings, photographs, and sketches followed closely on the release of engineering drawings. A similar group of tool design engineers from the Douglas and Vega companies assisted the Boeing company in performing this phase of the program. Lists of tooling material were prepared from the revised and checked tooling drawings and were released simultaneously with the tooling drawings.

A survey of existing tooling by the Tooling Subcommittee revealed that there was in existence in the Boeing plant a number of small tools for which there were no available drawings. These tools had been constructed in many cases by the workmen on the job during the preceding years of building B-17's. It was the decision of the BDV Committee that these tools represented "know-how" and would be of aid to the Douglas and Vega companies if the information could be transferred to them.

These small tools were reproduced in duplicate for Douglas and Vega. A schedule was worked out on the dates each of these tools could be released from Boeing production for the length of time necessary to permit reproduction. Local tool shops in the Seattle area were called upon to construct the duplicates, which were then approved by Boeing inspection before forwarding to the California companies.

In addition, Boeing furnished sample production parts selected by the Tooling Subcommittee so that the tools constructed at Douglas and Vega might be accurately checked. These parts were given a thorough inspection by Boeing to insure that they were accurate and representative, and then were painted blue to designate them as master parts.

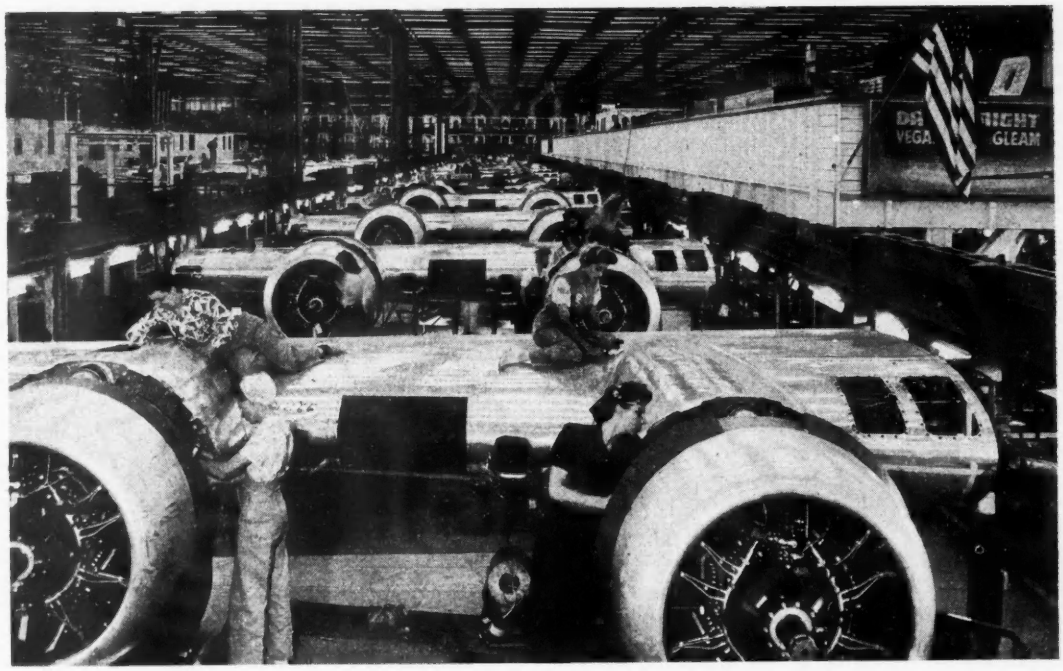
Plan and Information for Subcontracting

It was established at the outset of the three-way production program that there should be at least two geographically separated sources of supply for each major or critical part. Major subcontractors were selected who were to furnish two and in some cases three of the companies with the same major components.

The major subcontract allocations on this program gave rise to a situation that was new to the industry. A subcontractor building a major component, such as an outboard wing or a landing gear of given design, and furnishing it to three companies building the same airplane, would be working under three different sets of directions and production schedules.

To circumvent this possibility of confusion, the BDV Committee designated each of the three companies as being responsible for certain subcontractors. The term "technical prime contractor" was coined to cover this relationship. It is the responsibility of the technical prime contractor to furnish all original engineering drawings and subsequent change information, master tooling and tooling data, and check parts to the subcontractors under his jurisdiction. It is also his responsibility to maintain in the subcontractor's plant sufficient engineering liaison and inspection personnel to adequately interpret the data and provide any technical assistance that will aid the subcontractor.

When the nature of a subcontracted component is such to make it desirable, the technical prime contractor is responsible for the preparation of a group book. The group book is a document containing a detailed listing of all parts comprising the component, and defines exactly what the subcontractor is expected



B-17F production in Vega plant. Wing assembly line.

to produce down to the last dash number part. It also includes a listing of all applicable tooling data, bills of material, functional tests, process specifications, and interchangeability lists. The group book might be called a manufacturing specification since it specifies exactly the information and data the prime contractor is to furnish the subcontractor and, conversely, defines exactly the part that the subcontractor is to furnish the prime contractor.

Template Reproduction

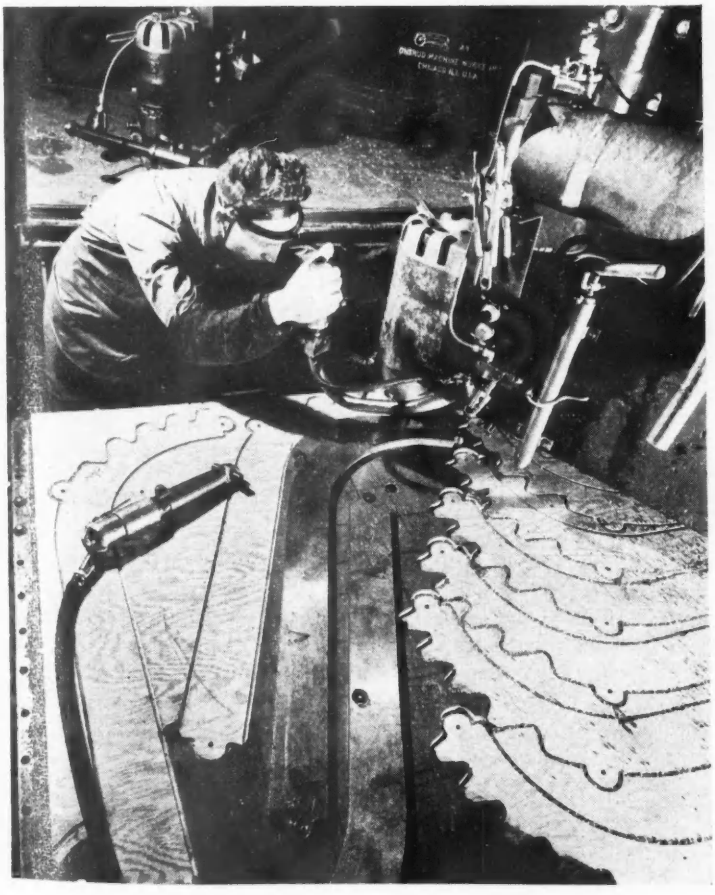
The huge task of template reproduction was carried on concurrently with the release of engineering and tooling drawings. Of no less importance than the drawings as a part of the vital data were the 16,000 templates. In addition to this group there were approximately 100 white templates or basic dimension layouts that were reproduced photographically at Boeing. The majority of the template work, however, was in flat patterns required for daily use in the factory.

The methods used in reproducing these patterns merit special attention. One by one the templates were laid on template master boards and then their information transferred by carefully scribing around their contour. The template master boards (in reality a metal plate coated with a special paint) were approximately 5 ft by 10 ft in size and included an average of 36 templates each. These master boards were shipped to Lockheed Aircraft Corp., whose Prest template facilities were used to make the electrolytic reproductions. Two copies of each were provided to both the Douglas and Vega factories where they were cut out to become working templates, and one copy forwarded to Boeing for their file.

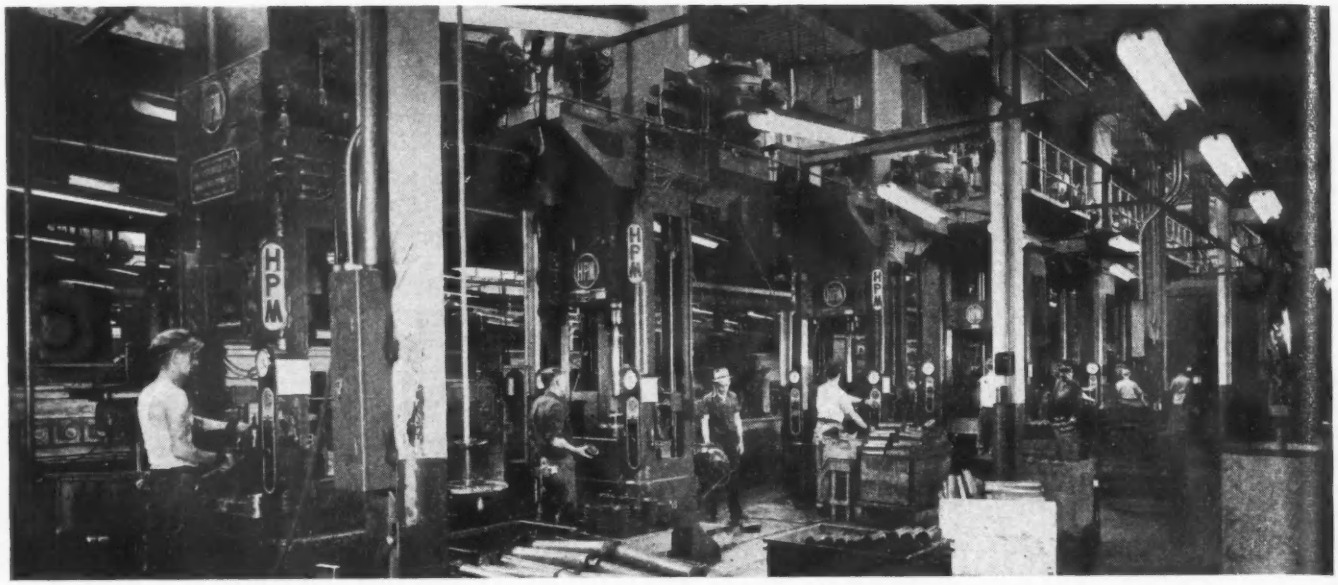
Pilot Airplanes

An interesting element in the body of data supplied to Douglas and Vega was the pilot airplanes. For the purpose of providing information on standards of workmanship and inspection standards, a Boeing-built B-17 was

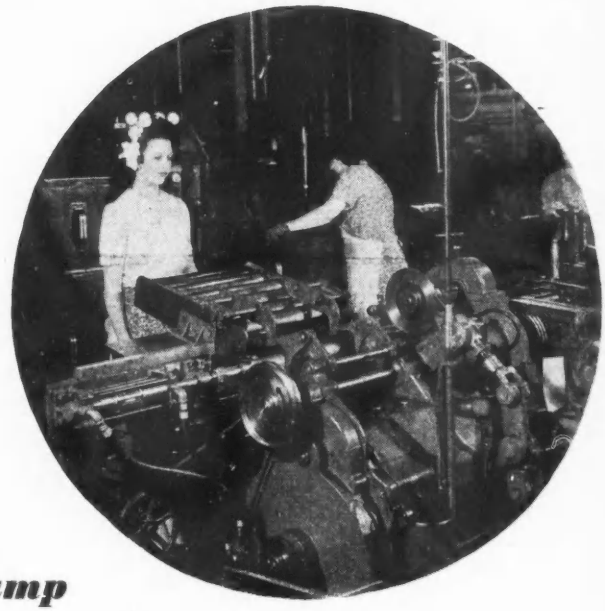
(*Turn to page 92, please*)



Modern machine tools have been an important factor in speeding up the production of Flying Fortresses. This photo shows a routing operation at the Boeing plant in Seattle.



General view of the 57 mm line, showing the long battery of H-P-M hydraulic presses.



Large hand-operated four-spindle New Britain-Gridleys are used on the 57 mm. head machining line. In the foreground is a large V & O trimming press.

Corcoran-Brown, Automobile Headlamp Maker, Now Producing

Steel Cartridge

THE Corcoran-Brown Lamp Division of The Electric Auto-Lite Co. is another example in our series of studies of automotive parts producers whose specialized talents have been turned to the production of the weapons of war. This division of Auto-Lite, in peacetime one of the best known manufacturers of headlamps and other lighting equipment for motor vehicles, is today a prominent producer of steel cartridge cases in a range of sizes embracing—20 mm, 37 mm, 40 mm, and 57 mm, the latter being a comparatively new addition to the line.

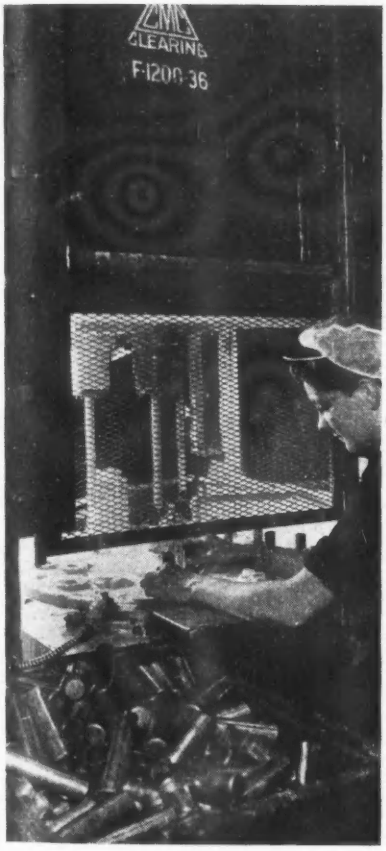
Member of the Integrating Committee for Steel Cartridge Cases of the Ordnance Department, Corcoran-Brown has played a leading part in the development of new techniques for the mass production of steel cartridge cases, and in keeping with the cooperative policy established by the Chief of Ordnance gives freely of its know-how and improvements in procedures to other interested members of the group. This process of give and take has been responsible for the remarkable advance in cartridge case development stemming from the critical need for conserving copper and brass which was devoured in such huge tonnages before the substitution of steel. Corcoran-Brown participated in the very beginning of the program, producing its first cartridge case in September, 1941, and successfully passing its first firing tests in October, 1941.

The basic drawing operations employed by this company are illustrated here. It will be noted that the process starts with a cold-forged steel cup drawn from a large steel disc or slug. The seventh stage embodies the development of the upset head, followed by the successive tapering operations on shells eight and nine. Except for certain intervening operations and annealing, the technique of making the entire range of cases is substantially the same for all sizes. The group of shells shown here is for the 57 mm size.

Through the work of the cooperative Integrating Committee group, standardization has been carried out

to the fullest extent within the limitations of the type of equipment available in each producer's plant. One interesting aspect of the situation is that regardless of the equipment it has been possible to achieve standardization of the draw rings. These are faced with a special grade of cemented-carbide and are supplied as standard dies by Carboloy and Firth-Stirling.

Because of intensive specialization in the field of metal drawing in peacetime, Corcoran-Brown has been able to contribute greatly to this program and, in turn, to offer the fruits of its new developments to others participating in the same activity. Generally speaking, Corcoran-Brown employs exactly the same basic steps in the production of cartridge cases of the entire range, the steps for the individual sizes differing only in detail from one another. Hydraulic presses are employed almost exclusively, using principally certain models of the well-known Clearing line and that of the Hydraulic Press Mfg. Co. The majority of the metal washing equipment is the familiar Blakeslee Niagara units. Annealing furnaces are supplied by Surface Combustion and by General Electric. In the larger sizes, mouth-annealing is handled on special equipment made by Morrison.



Fourth drawing operation on a 20 mm steel case in a Clearing hydraulic press. Note the dial feed for rapid loading of blanks.

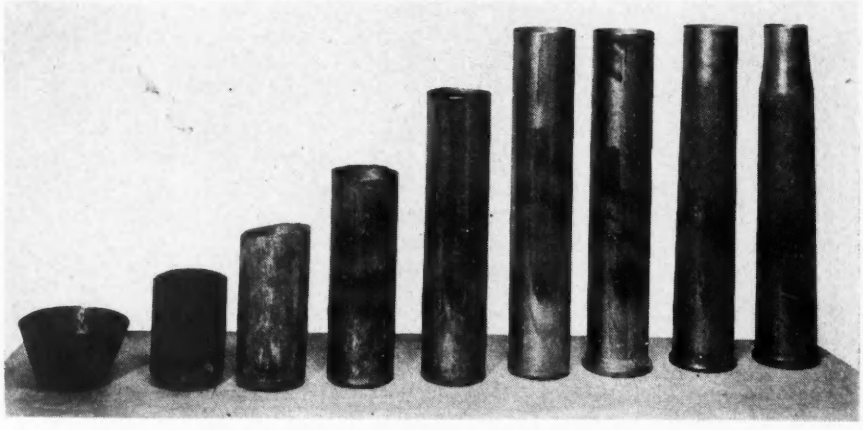
By Joseph Geschelin

Machining of the head is handled on 6-spindle New Britain-Gridley automatics with magazine feed on the smaller cases; and on huge 4-spindle New Britain-Gridleys for the larger sizes. Trimming of cases is done with V & O trimming attachments, mounted adjacent to the automatics. This company uses the cold-working process exclusively with suitable annealing operations. The in-between anneals are done at a temperature of 1650 F. Stress-relief annealing is done at a temperature of 725 F. Perhaps another variation between the production of small and large cases that is worth noting is that whereas the 20 mm size is handled at least four at a time in press dies and with the use of dial feed tables, the 57 mm size takes one at a time in an individual press.

Another interesting phase of the job is the use of a special "soap" coating operation to provide the only drawing compound used here. On the smaller cases, the combination of metal washing and soaping between draws is handled automatically in specially designed Blakeslee Niagara washing machines. On the 57 mm size, soaping is done by hand dipping in an open tank.

For a better picture of the general scheme of production, consider the steps in producing a 20 mm case. The cup-shaped blank is washed in a Blakeslee spiral washing machine, then annealed in a Surface-Combus-

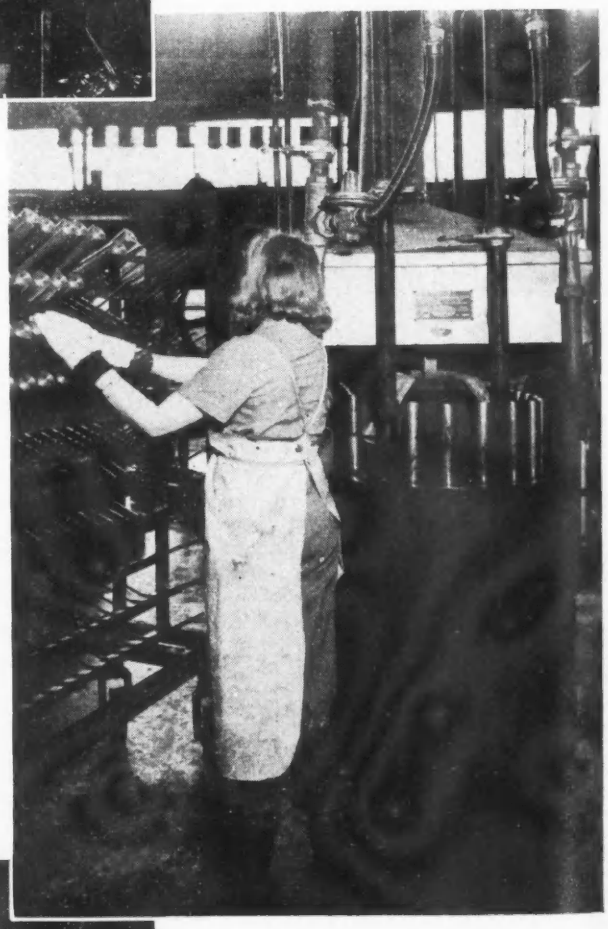
Cases in Large Quantities



This shows the stages in the development of a 57 mm steel cartridge case in the Corcoran-Brown procedure, starting with the cold-forged steel cup at the extreme left.

tion furnace. Next comes washing and coating in a Niagara machine to make ready for the first draw, four blanks at a time, in a Clearing 400-ton press. This is followed by the same cycle of washing, soaping, and annealing for the second draw in a 200-ton Clearing press. Then washing and soaping without anneal for the third draw in a 200-ton Clearing. Next washing, trimming in a V & O trimmer, annealing, and coating for the fourth draw in a 200-ton Clearing; washing and coating for the fifth draw in a 200-ton Clearing press; wash and trim for the heading operation in a 200-ton Clearing, thence to head machining in a 6-spindle New Britain-Gridley automatic. Work is washed in a Niagara belt type washer, coated, tapered in a special Bliss horizontal tapering press, trimmed in a Holmes or a V & O trimmer, burred at the mouth, washed, and mouth-annealed in a Morrison flame annealing machine. Then follows stress relief in an R. C. Mahon gas-fired oven, pickling of the mouth, sizing of the mouth in a No. 12½ Toledo press.

The work is again washed, oil dipped, inspected, cleaned, stencilled, and proceeds to the final operation of lacquering and baking. This stage is of unusual interest due to the nature of the equipment employed. Lacquering is quite conventional, but special provisions have been introduced to remove all drip and excess



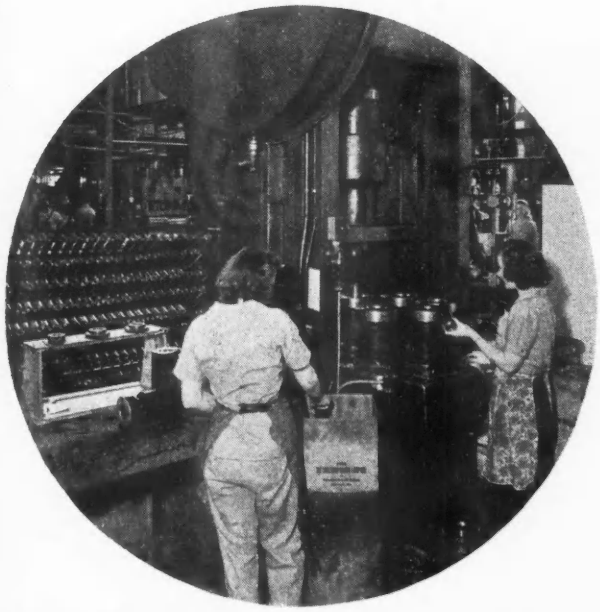
Body annealing of 37 mm cases is handled in this Morrison Engineering Co. conveyor type flame annealing machine which is typical for all sizes.

Automatic head turning, drilling, etc., of 20 mm steel cases on six-spindle New Britain-Gridley automatics, served by magazine feed.

Cup-shaped blanks, as received, are annealed for the first draw in this General Electric annealing furnace.

lacquer so as to eliminate even minute variations in size so detrimental to the proper functioning of the ammunition. This is accomplished by transporting the lacquered cases, successively over two electrostatically excited grids which remove all excess material by means of a high voltage electrostatic field through which the work passes. This device works so successfully that the observer can actually see the lacquer come off in a spray upon entering the first stage of the electrostatic field. The lacquer is baked by carrying the cases through a converted A-type enameling oven formerly used for finishing lamps.

Tapering operation on 37 mm cases in a Clearing press. This is done one at a time, using a five-station dial feed table as shown.

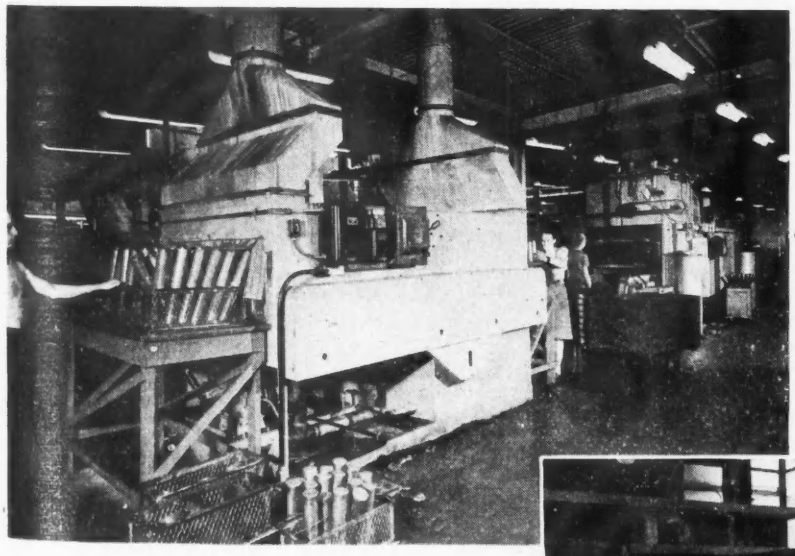


By contrast the 57 mm case goes through substantially the same series of operations except that the equipment is larger, the operations slower due to handling one case at a time, and with the addition of some annealing operations. First draw is handled in a 200-ton H-P-M hydraulic press; second, third and fourth draws in 150-ton H-P-M presses, with washing, soaping and annealing in-between. For the fifth draw, there is a wash and soaping without anneal, drawing in a 150-ton H-P-M press. A wash and trim operation precedes the heading operation on a 1500-ton Clearing press. Then comes washing in a large tank, body annealing in a Morrison machine, pickling, polishing the mouth.

The 57 mm case now is coated, takes the first taper in a 60-ton Clearing press, wash, neck anneal in a Morrison annealing machine, pickle, trim, and burr, wash, and second taper in the 60-ton Clearing. The case is then given the final trim, finished as to mouth and height size in a Toledo press. This is followed, in turn, by another wash, mouth anneal, mouth size in a Toledo press, stress relief in a Surface Combustion furnace, wash, pickle, and oil dip. Final operations are the same as for the 20 mm case—inspection, cleaning, stenciling, lacquering and de-tearing, bake and pack.

It may be observed from the foregoing that the sequence of annealing and trimming, and correction of mouth size have been worked out by extensive production research to the end that the number of such operations will be the very minimum consistent with the requirements of each size and with the minimum of cost. For the pickling operations, noted above, the work is handled in baskets, pickled in a phosphoric acid solution, rinsed, and given

(*Turn to page* 62, *please*)



Large Niagara washing machine used for 57 mm steel cases.

Lacquering operations, showing 37 mm steel cases. In the foreground is the lacquer dip tank. Directly to the rear of the dip tank is the electro-statically charged grid for detearing lacquer.

How Good are S

By E. L. Warner, Jr.

IT is the consensus of engineers and research men in the major rubber companies that all-synthetic passenger car tires are almost as good as pre-war natural rubber tires under the present war-time operating conditions, with emphasis on the 35 mph speed limit. However, commercial vehicle tires of synthetic are definitely inferior to those of natural rubber due to their heat generating tendencies. Synthetic rubber truck tires will not stand overloading and excessive speed. It is generally conceded that they will give 50 to 60 per cent of the wear of pre-war all-rubber tires under reduced operating speeds and no overload, but all the important factors of tire conservation, including proper alinement and inflation, must be observed if such tire life is to be obtained.

Synthetic rubber inherently generates more heat through energy than natural rubber. As the size of the tire is increased, more heat is accumulated, with a consequent breakdown in the composition of the tire carcass. Four and six-ply passenger car tires are thinner and not usually subject to overload, so they do not generate as much heat. But commercial vehicle tires of ten plies and upward will develop more heat, which is increased by excessive speed or any overloading of the individual tires. Use of rayon instead of cotton cord in synthetic truck tires helps minimize the heat factor because it withstands the heat better and a thinner cord can be employed.

Tires made of GR-S (government rubber, styrene type) are less resilient than natural rubber, transmitting any road impacts to the cord. This makes them more susceptible to bruising. When hot they are less resistant to cutting, chipping and cracking than natural rubber, another bad effect of the heat generating factor. Other ingredients must be discovered for use in synthetic rubber tires if they are to have greater elasticity and resiliency without sacrificing endurance. Chemical research by the rubber companies is the chief hope of improving this situation. That such hope is justified is borne out by the fact that on the basis of analysis of captured equipment and comparison with U. S. tires, this country has made more progress in the development of synthetic rubber tires in two years than has Germany over the last 10 years.

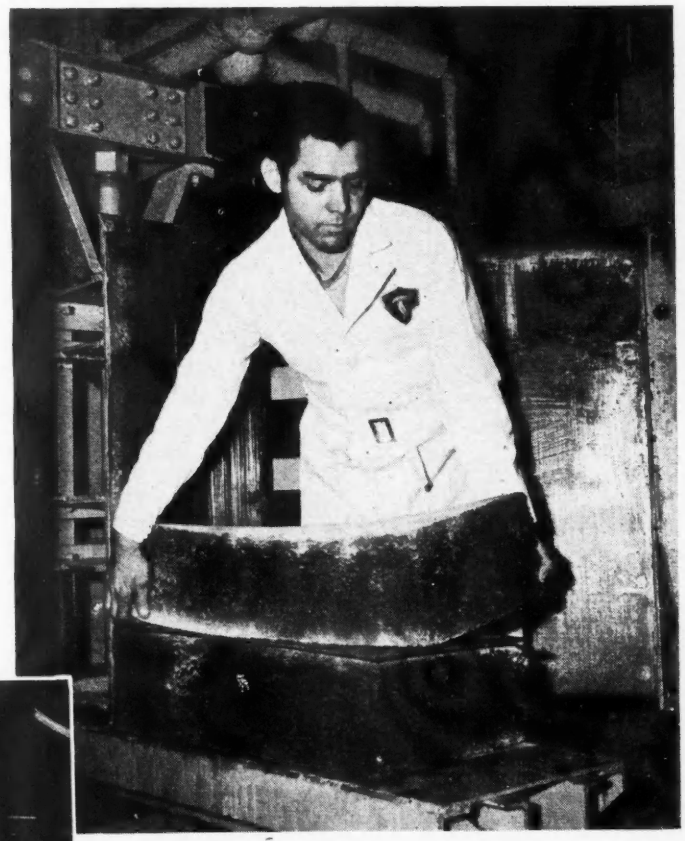
Because of its availability, GR-S is the only type synthetic rubber now being used in the manufacture of civilian tires under the government program. According to the Third Progress Report of the Rubber Director, 79 per cent of 1943 synthetic rubber production will be GR-S. S-3 tires, composed practically 100 per cent of synthetic rubber except for minute quantities of natural and reclaimed rubber to help in processing, have been in production since last March. These are for use on passenger cars and light trucks up to size 7.00 x 20 and eight ply.

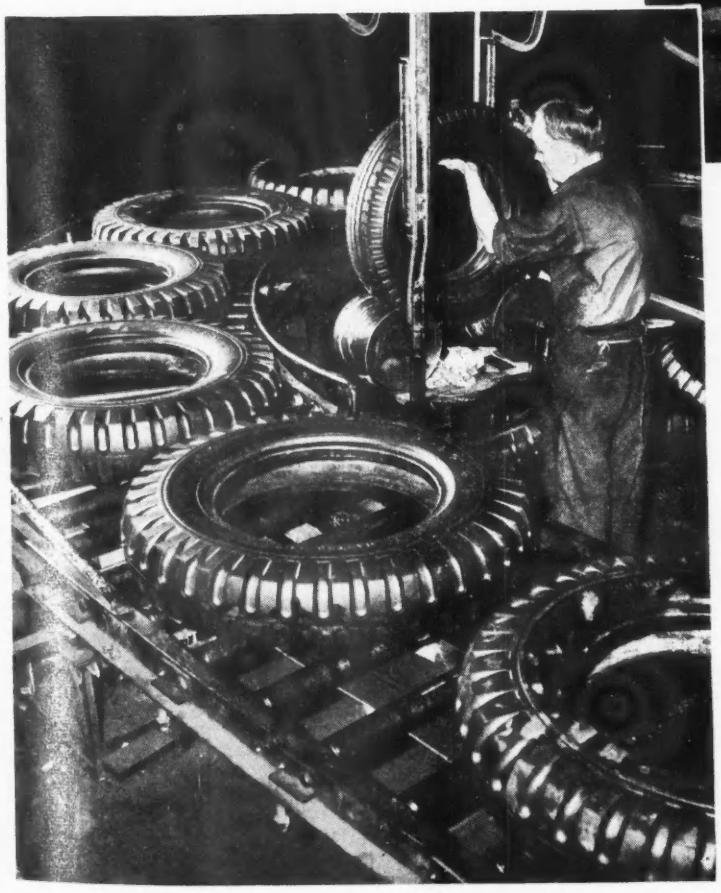
The initial synthetic rubber truck tires produced were S-5 and S-7, which were first manufactured last July. The S-5 type has a carcass of natural rubber

Synthetic Rubber Tires?

but the tread is synthetic rubber. The amount of natural rubber in this tire totals about 60 to 65 per cent and the synthetic 35 to 40 per cent. The S-7 permits the same amount of natural rubber as the S-5 but it is at the discretion of the manufacturer whether it all goes into the carcass or is distributed between the carcass and the tread. Natural rubber helps bond the tire carcass together and lessens the heat factor. Synthetic rubber has very good tread wear if the carcass is preserved.

Transition is now under way to the S-6 type commercial vehicle tire, which limits the natural rubber content to 30 per cent, with the remaining 70 per cent synthetic. At present the size limit on this type is 10.00 x 24 but larger sizes may be added as the crude rubber situation becomes more acute. The new types of synthetic rubber tires are being





(Above) At the synthetic rubber plant operated by The Firestone Tire & Rubber Co. rubber pellets are baled in 75-pound blocks. This baling process increases the density of the rubber from approximately 20 pounds per cubic foot to 55 pounds per cubic foot.

(Left) Tires made of buna S synthetic rubber are rolling by the thousands from the Detroit plant of United States Rubber Company.

tested daily on hundreds of trucks, buses and passenger cars under varying conditions all over the country. The Office of Rubber Director also has a test fleet of more than a dozen vehicles operating in Texas and the Rubber Manufacturers Association has a co-operative test fleet at Glendale, Ariz. In addition, the individual rubber companies have their own test fleets in California, Texas and elsewhere.

Ultimate upper limit for GR-S content in commercial vehicle tires appears to be 90 per cent, with 10 per cent natural rubber.

(*Turn to page* 76, *please*)

Some Features of the

DB-601

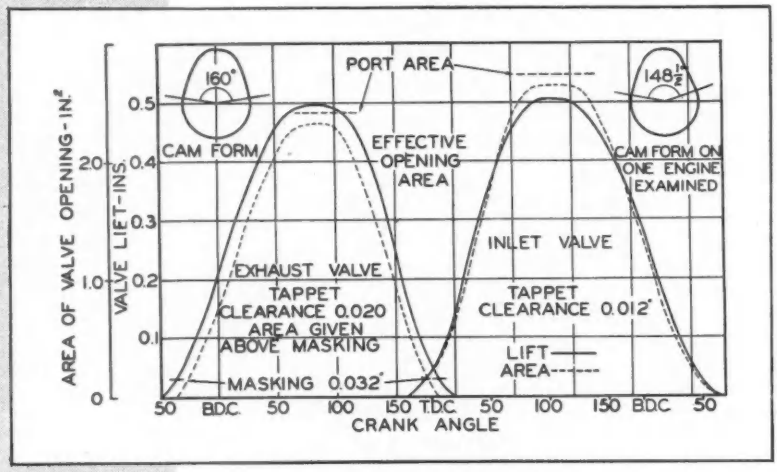


Fig. 1—Valve-lift and true opening area diagrams of DB-61A engine

AN UNUSUAL feature of the DB-601 engine is its masked exhaust valves. The chamfered valve seats are sunk 0.032 in. below the floor of the valve chamber, with the result that the valve begins to open only after it has been lifted that distance. The valve-lift diagram, Fig. 1, shows the effect of this masking in reducing the valve overlap and on the true area of valve openings. Another effect of the masking is that when the valves begin to open, they open more rapidly than they would otherwise. In connection with the areas of valve opening given in the diagram it may be recalled that the DB-601 has cylinders with a bore of 5.90 in. and a stroke of 6.30 in. There are two exhaust and two inlet valves in each cylinder. Inlet valves have an outside diameter of 2.24 in. and exhaust valves of 2.00 in. The exhaust valves are of austenitic steel, stellite-tipped and faced, with sodium-filled stems. Inlets are of silicon-chromium steel, stellite-tipped and with hollow

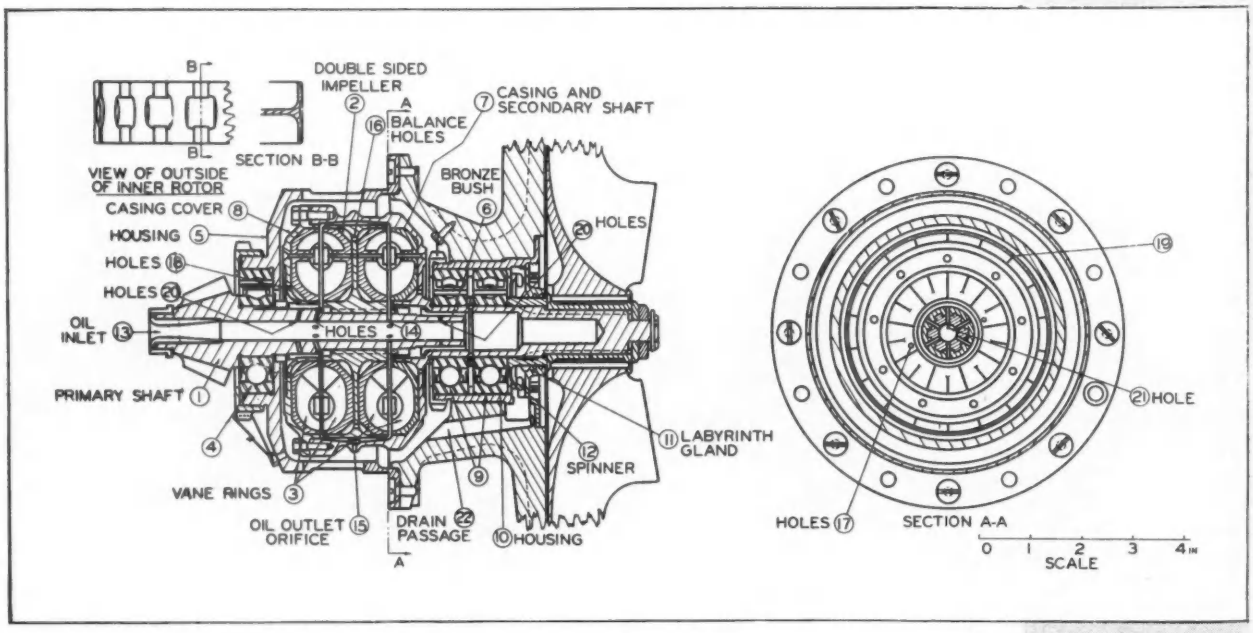


Fig. 2—Fluid coupling of the supercharger drive

Liquid-Cooled Aircraft Engine

By M. W. Bourdon
Special Correspondent of
AUTOMOTIVE *and* AVIATION
INDUSTRIES in Great Britain

A GENERAL description of the German Mercedes-Benz DB-601A aircraft engine appeared in *Automotive and Aviation Industries* of June 15 and July 15, 1941. Further studies of this engine, and especially of improvements in its design since that time, have been made in England, and the results of these studies have been made available by the British Ministry of Aircraft Production to our correspondent in Great Britain. The present article deals with some features of the engine not covered in our earlier description, and it will be followed by another article dealing with the latest improvements as embodied in the DB-601N model.

stems. The face angle is 45 deg. in each case.

Each valve has two carbon-steel springs (0.45 per cent C), with sand-blasted surface covered with a hard, golden-brown lacquer.

Ignition Control and Plug Cleaning

Provisions are made to permit the cleaning of fouled spark plugs while in place in the engine. To this end the spark is temporarily retarded, which has the effect of increasing the temperatures of the cylinder wall and the coolant, and this rise in temperature is depended upon to burn the fouling medium and to restore normal operation of the plugs.

The ignition-timing control consists of a spring-loaded piston in a cylinder formed in the auxiliary gearbox casting on the port side of the magneto. This piston, operated by engine oil pressure, is linked to a cross-shaft in the magneto, which through an internally-splined sleeve changes the phase of the contact-breaker cams. With the engine at rest, the timing is retarded to 14 deg. early; on starting the engine, the pressure quickly reaches the 15 psi required to move the piston to the fully-advanced position of 34 deg. early.

For cleaning fouled spark plugs while the engine is running, there is a device consisting of a small piston valve operated by a spring-loaded wire control. The valve normally closes an outlet port from the above-mentioned ignition-timing control cylinder, but when the wire is pulled pressure in the cylinder is released and the spark retarded. During a ground run at 1400 rpm, operation of the control resulted in the timing being retarded 10 deg. immediately (to 24 deg. early) and then gradually by 13 deg. (21 deg. early); engine speed dropped 400 rpm, and the coolant temperature increased by 12 deg. in one minute. It was found that fuel-wetted plugs causing a reduction in engine speed on one switch were usually cleared by the use of this device, but the maximum coolant temperature was reached before oiled-up or carboned plugs were cleaned, while longer use in flight gave no improvement when rough running of the engine was observed and found subsequently to be due to fouled plugs.

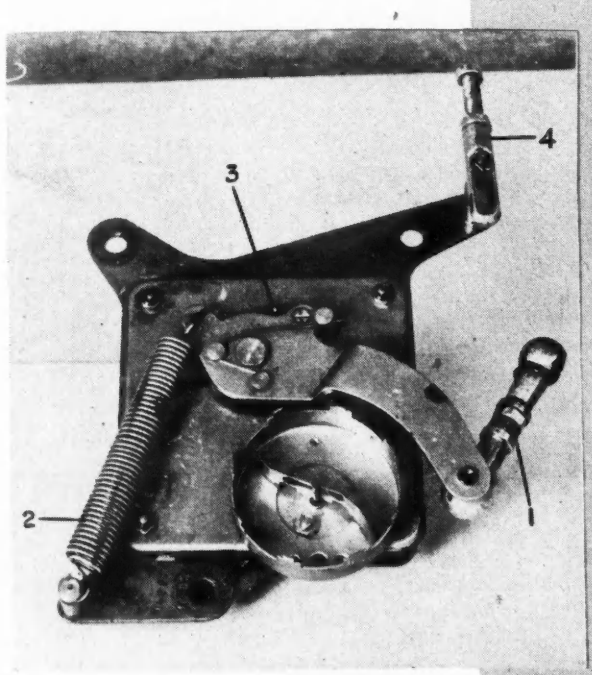


Fig. 3—Clockwork escapement of extra boost control, with cover of "windmill" case removed

Variable-Speed Supercharger Drive

The single-stage centrifugal supercharger was described and illustrated in AAI of June 15, 1941, but at the time a drawing of the variable-ratio hydraulic drive was not available. This drive comprises a hydraulic coupling of which sectional views are shown in Fig. 2. The gear ratio between the engine crankshaft and the primary side of the coupling is 10.39 to 1. The double-sided impeller 2, of 4.10-in. diameter, is made of steel and has duralumin vane rings 13 riveted to it. Its casing 7, with similar vane rings, is integral with the secondary shaft. The casing cover 8 is bronze-bushed and runs on primary shaft 1, while the secondary shaft runs in two ball bearings 9 in a steel sleeve at the rear of the supercharger casing. The impeller of the supercharger is splined to the secondary shaft of the coupling, and behind it are a labyrinth gland 11 and a spinner 12 in the ball-bearing housing.

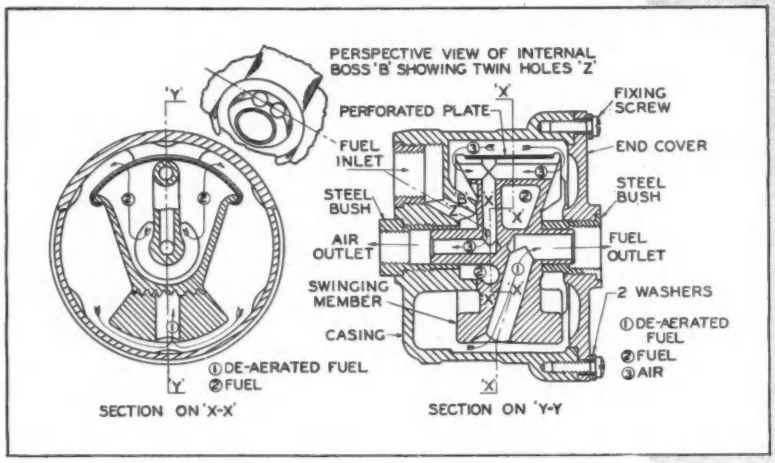


Fig. 4—Sectional views of Bosch fuel deaerator

The hollow primary shaft receives oil from a control pump through a small pipe that projects into the tapered inlet end 13, the oil then passing into the coupling interior through holes 14 communicating with the clearance spaces between the impeller and the casing vanes. Circulation is effected by allowing oil to escape through a 0.0445-in. orifice 15 in the impeller casing periphery, whence it drains back to the crankcase.

A ring of balance holes 16 is drilled in the impeller web. Two 0.04-in. holes 17 (shown in section A-A) through each vane ring communicate with the inner annular space at the back of the ring. Two pairs of 0.04-in. holes 18 in casing and cover, staggered relative to those in the vane rings, pass oil in the circuit back to the crankcase, through the inner annular spaces. The purpose of these holes presumably is to maintain all pockets full of oil and allow air to escape from the vane pockets. In addition, there are three 0.04-in. holes 19, spaced 120 deg., through the edge of the outer circumference of each vane ring, passing into the outer annular space behind the ring. These are provided for venting.

Holes 20 lead out from the bore of the primary shaft to a bronze bushing 6, while the end cap of this shaft is pierced with a small hole 21 to supply the secondary shaft bearings through a tube. The gland and spinner drain to the crankcase through passage 22. Transverse grooving on the periphery of the impeller apparently provides passages for the outlet oil, while central milling serves for balancing and producing turbulence to keep jet 15 clear.

Hydraulic-Drive Control

The slip of the hydraulic coupling depends on the amount of oil in the coupling. Oil is delivered by twin gear pumps. One of these delivers at its maximum rate continuously, while delivery of the second varies between nothing and the maximum, being controlled by the leading the discharge to the middle port of a piston-valve chamber, the two outer ports of which lead respectively to the coupling supply line and to a return to the crankcase. The piston valve is moved automatically by a twin evacuated capsule in a casing subjected to supercharger intake pressure.

It is found that the capsule commences to open the supply port from the second pump to the coupling when the atmospheric pressure drops to 24.32 in. of mercury, and opens it fully at 15.7 in. The coupling therefore will be supplied with a definite quantity of oil at any specific engine speed up to an altitude of 5640 ft., and at 16,800 ft. it will receive the full discharge of both pumps, so that its slip then will be a minimum (about 3 per cent). The impeller speed varies accordingly, but apparently this arrangement is not sufficiently sensitive for full boost control, for there is provided also an oil-servo-operated capsule control unit of normal design, operating a discharge throttle.

As the per cent of the power lost in a hydraulic coupling is the same as the per cent slip, considerable heat is generated, and the oil therefore is circulated through a cooler, which latter increases the frontal area of the radiator by 50 per cent, as compared with that found on the Heinkel 111 with Jumo engine. Judging by the color of the steel casing of the coupling, the oil in it sometimes approaches 480 F.

Throttle and Boost Controls

The air-throttle control system necessitated by the use of fuel injection comprises a butterfly throttle on the supercharger outlet, operated as previously stated, by a capsule-type boost control, and a second butterfly throttle—downstream relative to the first—operated by the pilot through direct linkage. The pilot has full

and uniform boost control up to the controlled boost pressure. He can also gain an increase of controlled boost pressure for periods of approximately one minute by an automatic over-riding and enriching device, put into operation by extra movement of his throttle lever, acting only on the boost controlled throttle.

The limited period of operation of the over-riding device is determined by "clockwork" mechanism, which consists of a windmill vane, spring-operated through an enclosed gear train and rotating with small clearance in a sheet-metal box, as shown in Fig. 3. The vane makes 1720 revolutions per inch of travel of the operating rod 1, the ratio being approximately 14,050 to 1.

Upon loading for extra boost, the pilot's lever pulls rod 1, return spring 2, and a ratchet stop at 3, the latter moving over a ratchet wheel connected to the primary gear, so winding up the clockwork mechanism. Irrespective of whether the pilot releases his lever or not, the tension spring (not shown in Fig. 3) takes effect, and progressively, at a rate determined by the spring tension applied to the rotating vane, returns the extra boost control to the normal maximum. Adjustment 4 is provided to time the period of extra boost by varying the tension of the concealed spring. The over-riding device acts only upon the boost-controlled throttle, through the agency of a throttle-control gearbox.

Fuel-Injection System

The fuel pressure pump delivering to the injection pump unit is of the gear type, with two separate sets of gears having individual inlet connections and a common discharge line. It is mounted across the auxiliary gearbox. A piston-type relief valve fitted requires a pressure of 14 psi to open it. The valve is also balanced to the boost pressure between the two throttles. The pressure pump delivers through a de-aerator to the injection pump, whence the metered fuel is injected into each cylinder through a steel pipe of ⅛-in. bore and a multi-hole nozzle.

Two sectional views of the pendulum-type de-aerator are shown in Fig. 4. It has a cast iron de-aerating element swinging on an integral spindle in two bushings. Fuel flowing upward in the interior of the element sprays through the 0.04-in. holes in a perforated plate, which always remains at the top, irrespective of the attitude of the aircraft. The fuel then passes to the bottom before rising into a passage in the element leading to the outlet through the hollow spindle. Air separated at the perforated plate escapes through an outlet at the other end of the hollow spindle, and returns to the main fuel tank through a pipe that also carries back excess fuel delivered to the injection-pump gallery. The official report comments: "It appears possible for some de-aerated fuel to pick up air after passing through the plate."

Injection Pump and Nozzles

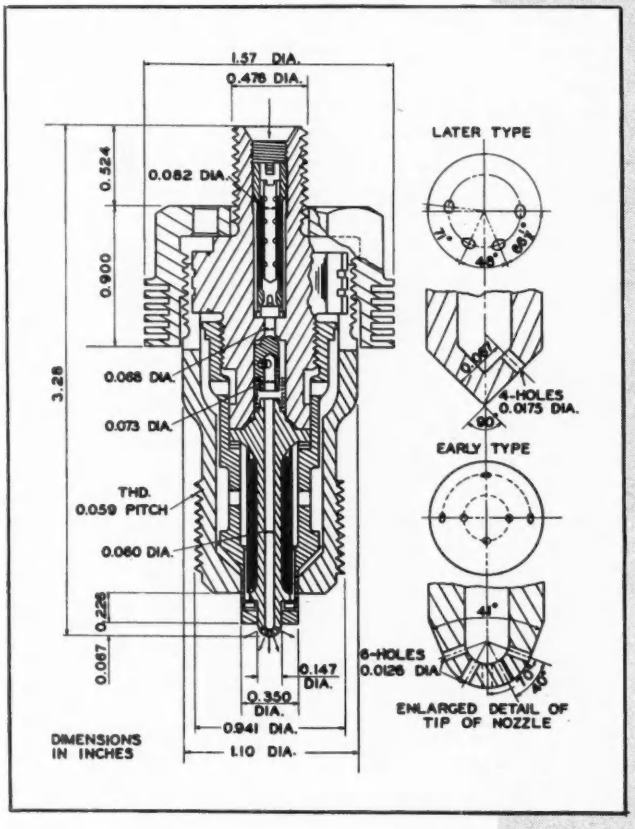
The injection-pump, with its twelve cam-operated units in line, is of conventional Bosch design with rack control, the rack being operated automatically by capsule and diaphragm within a control box. The latter regulates the fuel delivery to give a predetermined mixture irrespective of variations in inlet manifold pressure (boost), exhaust back pressure, and air temperature in the inlet manifold.

For a given altitude the fuel delivery is proportioned according to inlet-manifold pressure by movement of a spring-loaded diaphragm acting on the control rack. Correction for changes in exhaust back pressure is obtained from linkage arranged to give a small increase in fuel charge for a reduction in back pressure, and vice versa. For correction for air temperature, a temperature-sensitive capsule filled with mineral oil is screwed into the induction manifold; expansion of the fluid causes a charge-reducing movement of the control rack of the injection pump.

The injection nozzles are held by clamp nuts in adapters screwed into the cylinders on the inside of the Vee, between the inlet valves, locked by grub screw at 70 deg. F. to the cylinder axis. Each nozzle contains a double labyrinth filter, a spring-loaded non-

(*Turn to page* 62 *please*)

Fig. 5—L'Orange type injection nozzle, with early and more recent arrangement of spray orifices



Injection Pump T

FOR testing injection pumps for Diesel (and gasoline) engines, a pump test stand is a necessity to check and equalize delivery on the pump units. It also is used to determine speed-delivery characteristics of the pump. If the test stand is supplemented with a stroboscope or oscillograph, many other relevant injection characteristics can be determined.

Since no injection pump test stand is on the market manufacturers of Diesel engines and injection equipment and even service stations have to build it themselves. The following notes relate some experiences in building successful pump test stands:

A pump test stand must be heavy so that it can stand high speed operation without much shaking. Therefore, it should be of cast iron construction. A used small size planer bed can be used advantageously. A heavy steam table (frankfurter stand) is also suitable, see Fig. 1. If no cast iron bed is available, poured concrete is a good substitute. A recently-built 3 ft. by 8 ft. reinforced concrete test stand has a number of anchored nuts in the surface for fastening equipment and a 6 ft. by 8 ft. hole is provided for belt drive. Six 4-in. diameter cast iron pipe legs support the table, which has an angle iron rim around the edges.

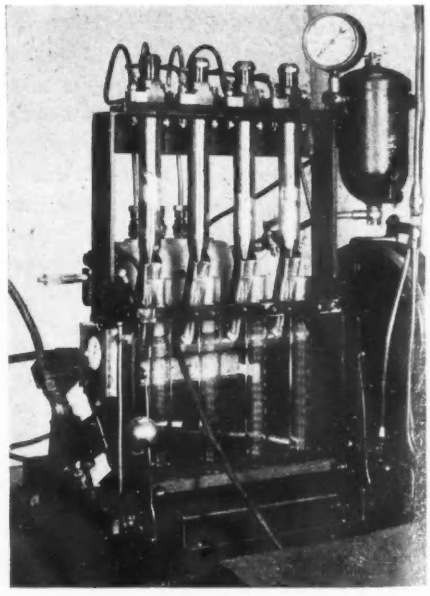
For variable speed drive it is probably the cheapest to use an oversize d-c motor with a rheostat control. The motor power should be many times the maximum power absorbed by the mounted test pump. It should not be less than 3 hp even for testing the smallest size pumps. With the use of a variable speed motor (like Reliance) or mechanical speed changer, the motor may be smaller.

Through a step pulley the motor drives the drive shaft on which a flywheel is keyed. A bearing on both sides of the flywheel is the preferred arrangement but if the flywheel is not very heavy it may overhang. The flywheel should be graduated with a degree scale for reference. Through an adjustable coupling the drive shaft is connected to the test pump which is mounted on the mounting plate with suitable shims. The drive shaft is also connected to a tachometer.

Unless all test pumps use their own fuel supply pump the pump test stand should be furnished with a supply system. This may be of the gravity type with an overhead tank and a float controlled motor driven transfer pump to lift the fuel from the waste tank to the supply tank. The supply tank may also be under a specified air pressure from the shop air. The customary filters and overflow valves complete the equipment.

To calibrate injection pumps, the discharge from each pump unit must be collected into graduates over a known number of pump strokes. Tilting funnels are used as shown in Fig. 2. The discharged fuel flows through the funnels to a header and to the waste tank on the lower right corner of the picture. By moving a hand lever (at left in Fig. 2), the funnels move into the mouth pieces of the injector nozzle baffle tubes. The baffle tubes fit the injectors snuggly and are provided with baffles and beads to damp the fuel spray and prevent splashing.

When the lever-actuated linkage tilts the funnels out and the graduates in, a cam operated push rod starts a stop watch and a counter which latter is driven from the pump shaft by a flexible shaft. In this manner the instant the graduates begin to collect the fuel discharge, the counter begins to count the revolutions (strokes) and the stop watch the time. Fig. 3 shows the test in progress with the graduates in collect position being slowly filled up. When the graduates are almost full, the operator switches the lever back to



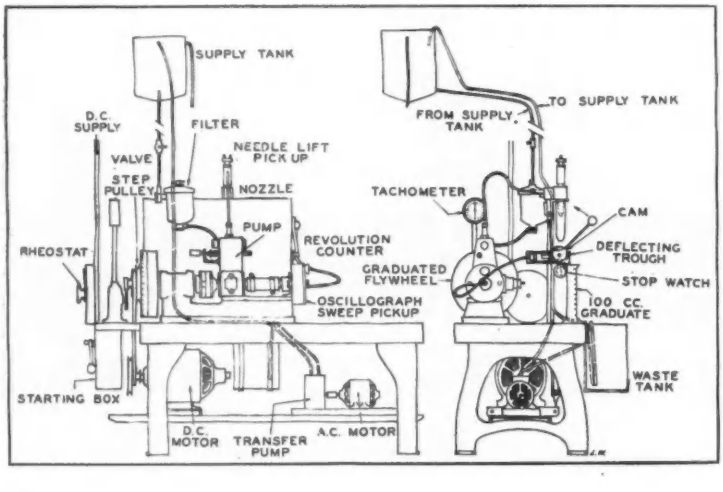


Fig. 2. (Above) Tilting funnels in "waste" position.

Fig. 1. (Left) Sketch of pump test stand.

"waste" position which stops the stop watch and counter and the filling of the graduates. Now the volumetric amount discharged by each pump unit can be read. Together with the time and revolution readings, this gives the pump speed and the quantity of injection per stroke. If these readings are taken over a certain speed range, the speed delivery characteristics of the pump can be obtained. For control rod setting a micrometer head is used.

When the readings are completed the content of the graduates is dumped into the waste tank as shown on Fig. 4. When the rack holding the graduates tilts down a linkage automatically lifts the lid of the tank and in this way contamination of the fuel is avoided. The whole testing can be performed with practically no oil splash or mess.

Instead of operating the counter and stop watch mechanically, they can be operated electrically. The Standard Electric Time Co. markets a compact instrument that performs these functions and includes an accurate direct reading tachometer also.

The delicate part of the testing process is the change-over from "waste" to "collect" position and vice versa. This must take place without splashing oil and simultaneously with the start of the stop watch and counter. For this purpose the graduates must move into position the instant the funnels clear, all idle motion being avoided. This is accomplished by concaving the tilting funnel tops (see Fig. 4) and by an appropriate adjustment of the actuating linkage.

Fig. 5 is a typical graph showing the results obtained with the pump test stand. Three control rod settings were used: 10.4, 8.4 and 6.3 mm for the stop position. The corresponding deliveries were 100, 65 and 30 cu mm per stroke at 500 rpm.

The graph shows that the maximum spread was 3 cu mm or 3 per cent at high rack setting and 3.5 cu mm or 11 per cent at low rack setting at 500 rpm. These inequalities are tolerable. At high speed and at intermediate rack settings the inequalities were greater. Some manufacturers limit the inequalities at 5 per cent at normal full load and at a higher figure at idling load.

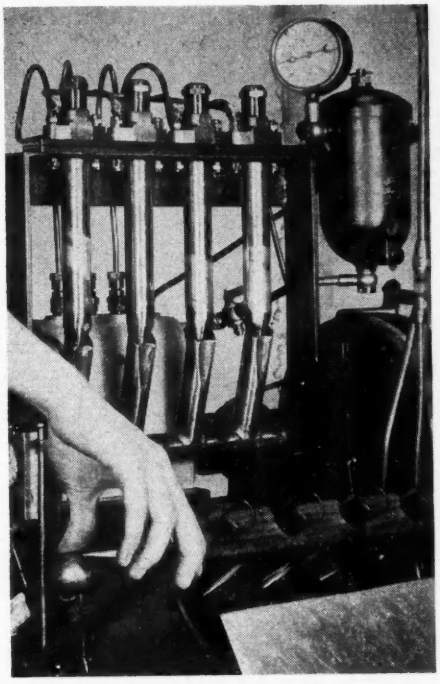


Fig. 4. Dumping the Content of the Graduates into the Waste tank.

By P. H. Schweitzer
Professor of Engineering Research,
Pennsylvania State College

Test Stand

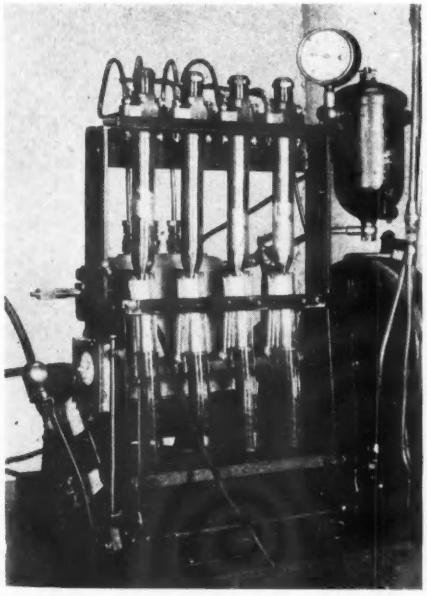


Fig. 3. (Left) Graduates in "collect" position.

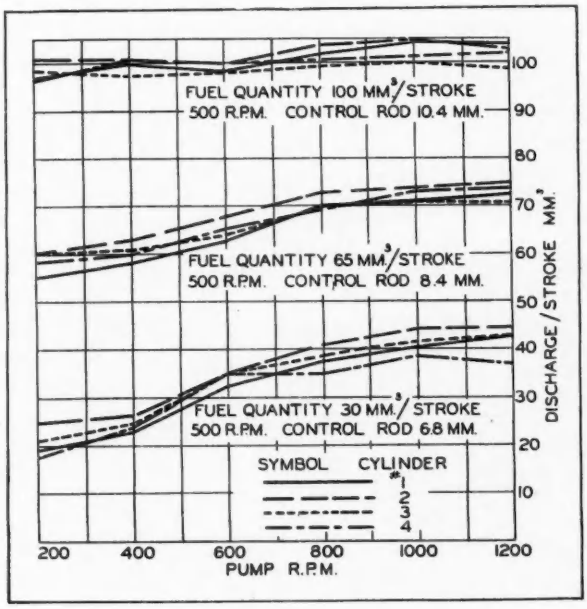
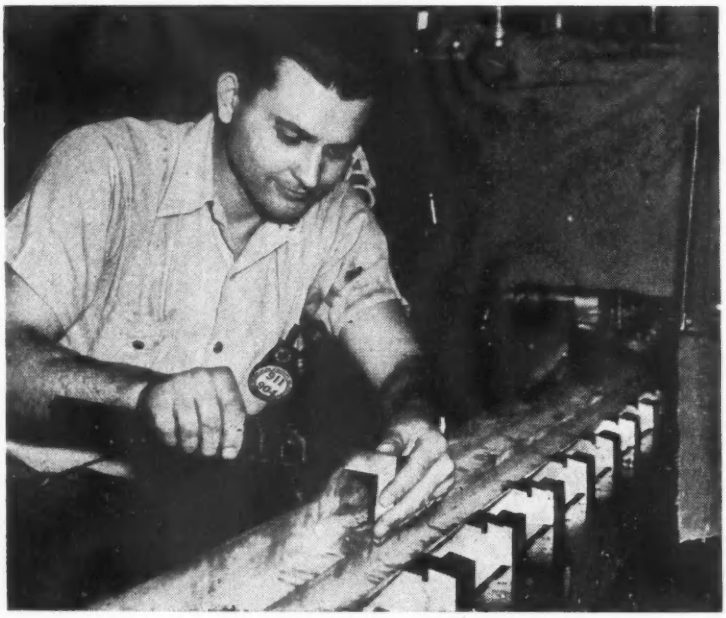


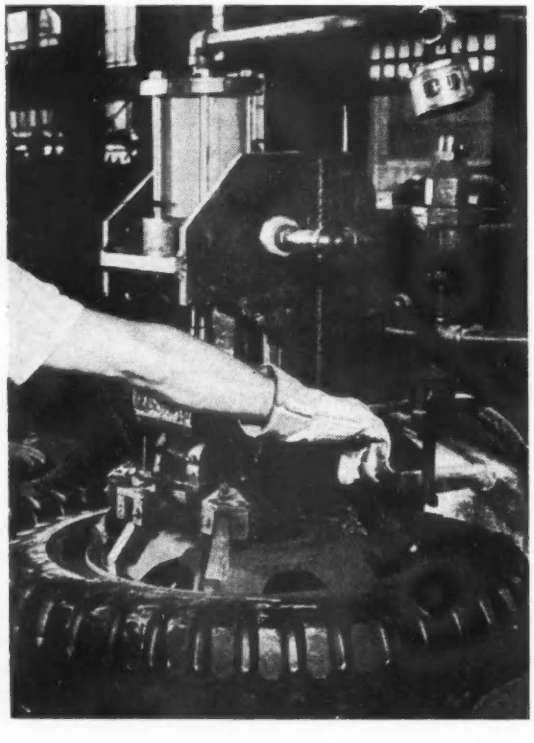
Fig. 5. (Right) Typical graph showing the results of pump calibration tests. Four cylinder Bosch Pump APE 4B 90. Nozzle DN 30 S3. Valve opening pressure 1500 psi. Discharge tubing ¼ in. OD by 14 BWG by 20 in. Standard (retracting type) delivery valve.

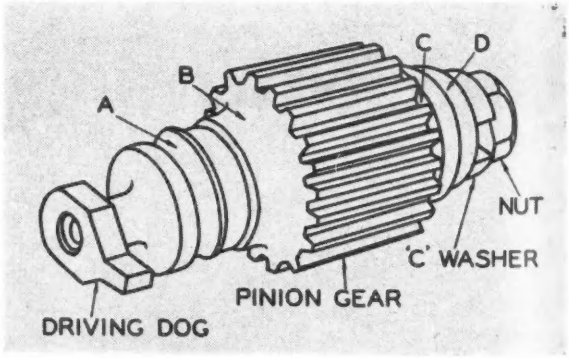
Short



Most outstanding plant suggestion of 302 awards in August at the Santa Monica plant of the Douglas Aircraft Co. was turned in by Ivan J. David, spar cap machinist, who received the major award of $650 and a gold merit award pin for developing a method of using Kirksite tooling instead of steel to mill spar caps, thus saving a great amount of time and expense in making the tools. By the new method blocks of Kirksite are cast and bolted to the bed of the spar cap mills and machined to the proper shape and bevels to hold the spar cap in position while being machined. In addition, Kirksite, being an inert metal, tends to dampen out vibrations, resulting in a much smoother cut and saving many additional hours in smoothing. Also, when contract expires and the tools are obsolete, they can be melted and used again.

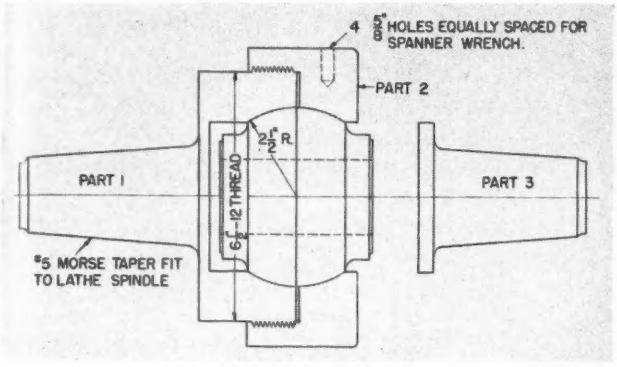
More than 2500 man-days a year are the expected saving of this tire ring, hydraulic locking press designed and built by The Studebaker Corp. to take care of heavy military truck production. Formerly men with mallets hammered the ring under the wheel rim to fasten the tire securely. With the Studebaker invention, a single worker pulls a lever and four claws exerting 21 tons of pressure snap the ring into place. One operator does the work of five men.



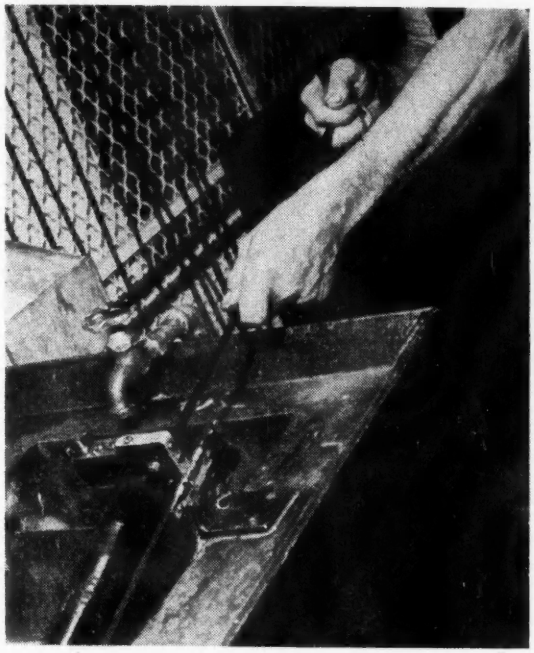


By redesigning a driving dog and arbor the necessity of reversing the pinion gear in the grinder for the second operation was eliminated at the Aircraft Engine Division of the Packard Motor Car Co. The operation involved the finish grinding of four faces on the shaft indicated by A, B, C, D, and the outside diameter of the pinion gear. The arbor was designed to be used with a universal driving dog on either end, as the distance between the side of the gear and the outer end of the gear shaft with the dog attached was insufficient to permit the use of the wide faced wheel required for the teeth. Faces C and D were first ground. Then the piece was removed from the machine, turned end for end with the dog attached to the opposite end and faces A and B and the OD of the teeth were ground. With both arbor and driving dog redesigned, the gear shaft is held on the arbor by a C washer and nut and the dog has a sufficiently small swing to permit the grinding wheel to pass without interference. As a result of these changes the five operations are performed without removing the piece from the machine nor changing the driving dog. Production increased from 19 to 26 pieces per hour.

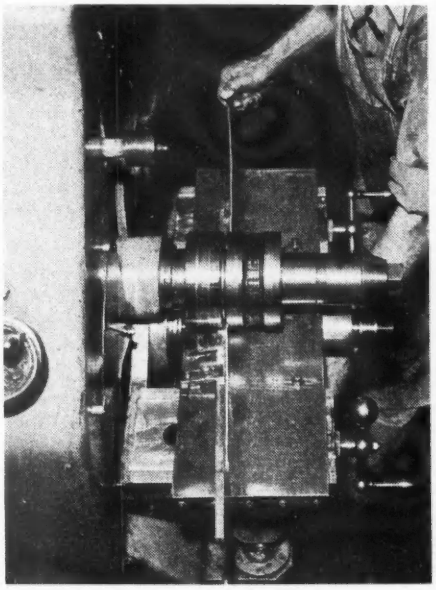
Cuts



This holding fixture developed at General Electric's Schenectady Works makes possible speedier and more accurate boring, turning, and facing of split-type ball seat bearings for a high-speed machine. The fixture has three parts. Part one has a tapered shank to fit the lathe spindle and a ball seat fit to receive the bearing. Its outside diameter is threaded for a holding nut, part two. Part three is a center which fits the tailstock. In a routine setup the tapered shank of the fixture is slid into the lathe head, and the bearing is placed in the ball seat fit. The holding nut is then put on and tightened by hand. The flanged center is placed in the tailstock and tightened against the face of the bearing so that it is absolutely square with the machine. The holding nut is then tightened with a wrench and with the tailstock pushed out of the way, the part is in position for boring.



Prior to the use of this small jig, which was constructed at a cost of $25, two men were required to do this job of cleaning machine gun barrels. The old method consisted of one man holding the gun barrel stationary in the tank while a second worker handled the cleaning rod, inserting it in the barrel and moving it back and forth. The new method consists of one worker placing the gun barrel in the jig on the tank side which hold the barrel in the required position. The same worker then performs the operation with the cleaning rod. This idea saves approximately $10,000 per year at the Vega Aircraft Corp.



This special setup was devised at the Vultee aircraft plant for straightening parts that are cut from heavy stock and twisted by the operation. A Wilson Roll is used to do the straightening as shown in the photo and a saving of 3500 man-hours yearly results.

This retainer for bits to be used in the assembly of tank hulls at the Grand Blanc tank plant of the General Motors Fisher Body Division has resulted in a saving of several hundred dollars. Previously the blade and holder were one piece and the entire part was discarded when the blade was broken. For making the retainer and bit separate, a slot is machined in an old socket, together with two holes. Bits made from scrap weld are inserted in the holder retained by a pin. Cost of the bit retainer has been reduced about $2.50 each.

National Metal Congress and

EXTENSIVE plans and preparations have been completed for the National Metal Congress and the War Conference Displays which are to be held under the auspices of the American Society for Metals at the Palmer House, Chicago, the week of Oct. 18. At a recent meeting of the A.S.M. Publication Committee, the technical program was completed and the papers assigned to the various sessions.

A series of seventeen sessions on production, conservation and post-war planning in the metal industry will be presented during the five days that the meeting is in progress. Nearly 200 outstanding men in the industry have been invited to participate in these practical clinics on some of the most pressing problems of today and tomorrow. These American Society for metals sessions will provide a clearing house for the practical solution of production problems, of conservation demands and of the many postwar thoughts encountered every day.

For example, there will be a session Wednesday afternoon, Oct. 20, on Post-War Planning in the nonferrous metals. This session may not provide the final answer to the question as to what will happen to our vast supply of light metals when victory is won, but the engineers who have been invited to discuss the problem may be depended upon to offer ideas that will go a long way toward clarifying the situation. The same session will deal with copper, zinc and lead in addition to

TECHNICAL PROGRAM OF THE AMERICAN SOCIETY FOR METALS

National Metal Congress, Oct. 18-22—Headquarters at Palmer House, Chicago

Monday Morning, October 18

Quenching and Hardenability of Hollow Cylinders, by J. H. Hollomon and C. Zener, Watertown Arsenal.

Rates of Cooling in Blocks and Cylinders, by C. B. Post and W. H. Fenstermacher, Carpenter Steel Co.

An Evaluation of Quenching Oils, by E. K. Spring, P. T. Lansdale and C. W. Alexander, Henry Disston & Sons, Inc.

Simultaneous Session

An X-Ray Study of Brasses Formed by the Interdiffusion of Copper and Zinc Deposited on Glass by Vaporization, by A. A. Burr, Armstrong Cork Co.; H. S. Coleman, H. L. Yeagley and W. P. Davey, Pennsylvania State College.

Dimensional Changes Encountered in Tube Sinking, by W. M. Baldwin, Jr., and T. S. Howald, Chase Brass & Copper Co.

A Metallographic Study of the Decomposition of Austenite in Manganese Steels, by John V. Russell, Republic Steel Corp., and Francis T. McGuire, University of Kentucky.

Simultaneous Session

The Microhardness Tester as a Metallurgical Tool, by Constance B. Brodie, General Electric Co.

Intercrystalline Cohesion of Metals, by E. R. Parker, General Electric Co.

Plastic Flow and Rupture of Metals, by C. Zener and J. H. Hollomon, Watertown Arsenal.

Tuesday Morning, October 19

The Effect of Varying Amounts of Martensite Upon the Isothermal Transformation of Austenite Remaining After Controlled Quenching, by H. J. Elmendorf, American Steel & Wire Co.

Martensite Reactions in Alloy Steels, by Peter Payson and Charles H. Savage, Crucible Steel Company of America.

Influence of Nickel, Molybdenum, Cobalt and Silicon on the Kinetics and Ar'' Temperatures of the Austenite to Martensite Transformation in Steels, by H. H. Chiswick, Battelle Memorial Institute, and A. B. Greninger, University of Chicago.

Simultaneous Session

High speed Testing of Mild Steel, by J. H. Hollomon and C. Zener, Watertown Arsenal.

The Effect of Heat Treatment and Carbon Content on the Work Hardening Characteristics of Several Steels, by John H. Hollomon, Watertown Arsenal.

The Tensile Properties of Alloyed Ferrites, by C. E. Lacy, International Nickel Co., and M. Gensamer, Carnegie Institute of Technology.

Simultaneous Session

A Study of the Nitriding Process—I. Effect of Ammonia Dissociation on Case Depth

(*Turn to page 84, please*)

AIME METALS DIVISIONS' EVENTS

Headquarters at Hotel Sherman, Chicago, Oct. 16-20

Saturday, October 16

Noon—Joint Luncheon

Afternoon—Session on Production of Magnesium

The Pidgeon Process.

Operations at Basic Magnesium, Inc.

The Kaiser Seawater Plant and Hansgirg Process.

Sunday, October 17

Morning—Field Trips

To Strip Operations of Northern Illinois Coal Co. and Open Pit Operations of Illinois Clay Products Co., near Joliet.

Alternate Trip: Special Conducted Tour of Museum of Science and Industry, Jackson Park.

Noon—Luncheon for Field Trip

Afternoon—Technical Session

Coal and Oil Resources of Illinois, by M. M. Leighton, Director, Illinois Geological Survey.

Evening—Dinner Meeting, Chicago Section

Fuels of the Future, by Ralph Sherman, Battelle Memorial Institute.

Monday, October 18

Morning—Regional Meeting on Refractory Problems from the Production Man's Standpoint

Refractory Problems in Ferrous Metal Production.

Refractory Problems in Non-Ferrous Metal Production.

Meeting the Difficulties.

Morning—Iron and Steel Division

Theory of Deep Drawing: Two papers, arranged by Karl Fetters.

Morning—Institute of Metals Division

Physical Metallurgy and Electron Microscope.

Noon—Joint Luncheon

Afternoon—Regional and Iron and Steel Division

Description and Economics of Kaiser Plant at Fontana.

Description and Economics of Columbia Steel Co. Plant at Geneva, Utah.

Afternoon—Iron and Steel Division

Symposium on Deep Drawing.

Afternoon—Institute of Metals Division

Symposium on Practical Aspects of Diffusion, arranged by E. A. Anderson.

4:00 p. m.—General Meeting, Board of Directors

Evening—Joint Regional and Divisional Dinner

Tuesday, October 19

Morning—Iron and Steel Division

Hardenability and Jominy Tests; Three or four papers.

Morning—Institute of Metals Division

Copper and Copper-Rich Alloys; Three or four papers.

Noon—Luncheon Meeting

Executive Committee, Iron and Steel Division

Afternoon—Symposium

Joint Symposium on Cohesive Strength; Four technical papers plus informal discussion, arranged by Maxwell Gensamer.

Wednesday, October 20

Noon—Luncheon Meeting

Executive Committee, Institute of Metals Division

Afternoon—Iron and Steel Division

Symposium on Segregation in Steel.

Afternoon—Institute of Metals Division

Technical Session on Physical Metallurgy.

War Conference Display

the light metals, aluminum and magnesium.

Another of the post-war angles to be discussed on Thursday afternoon, Oct. 21, will deal with fundamental changes that may be expected in metallurgy and metals generally. Melting, refining, fabrication and treatment will be discussed from an after-the-war point of view. On the same afternoon, a simultaneous session will deal with light weight construction for the post-war era and here, in addition to aluminum, magnesium and stainless steels, there will be a comprehensive discussion of the place plastics and wood will have in the picture.

The seventeen sessions will be launched Monday afternoon, Oct. 18, with a discussion of advanced quenching practice. The problem of proper quench has assumed real importance during the war when such products as armor and armor piercing shot depend on the correct quenching practice for great hardness and toughness.

The purchase of steels on expected performance, which is the European practice, rather than on chemical analysis as used in this country, will feature one of the evening sessions on Monday, with the other simultaneous sessions devoted to non-destructive tests involving inspection of rough material, appraisal of surface finishes, X-ray inspection and interpretation of Magnaflux.

Powder metals will be discussed Tuesday afternoon, Oct. 19. This session will deal not only with the raw materials and manufacture of powders, as well as their physical properties, but will take up post-war possibilities, discussing their substitution for die castings, drop forgings or screw machine products. A simultaneous session the same afternoon will deal with special alloy addition agents for steel, with another session on steel making methods scheduled for Tuesday evening.

Another Tuesday afternoon session will be on foundry metallurgy, with discussion of melting methods, high strength cast irons and steels, centrifugal casting, pressure molded die castings, and continuous casting of non-ferrous ingots or shapes.

(*Turn to page* 80, *please*)

PROGRAM OF AMERICAN WELDING SOCIETY

Twenty-fourth Annual Meeting, Oct. 18-21. Headquarters at Hotel Morrison,

Monday, October 18

9:30 a. m.—Opening Session

Presentation of Medals and Prizes; the Adams Lecture.

2:00 p. m.—Session on Cutting

Flame Cutting Heavy Sections and Large Diameters, by R. L. Deily and E. Benyo, Bethlehem Steel Co.

Welding and Cutting in Steel Mills, by T. W. Morgan, American Rolling Mill Co.

Electronic Control of Gas-Cutting Machines, by R. D. McComb, General Electric Co.

Machine Cutting for Assembly Line Fabrication, by Charles O. Adams, Delco Products Div.

2:00 p. m.—Railroad Session

The Welded Locomotive Boiler, by E. G. Young, University of Illinois.

Welding as It Applies to Railroads, by Robert Moran, Missouri Pacific R. R.

Railroad Shop Welding and Cutting, by J. W. Kenefic, Air Reduction Sales Co.

Welding of Railroad Transport Equipment, by C. Dreutzler, Electro-Motive Corp.

2:00 p. m.—Weldability Session

Investigations at Lehigh, by Gilbert E. Doan, Lehigh University.

Investigations at Rensselaer Polytechnic Institute, by Wendell F. Hess, Rensselaer Polytechnic Institute.

The Weldability of Silicon Steels, by C. E. Jackson and G. G. Luther, Naval Research Laboratory.

Weld Bead Hardness Tests on Plain Carbon, Nickel and Nickel-Chromium Steels, by Oscar E. Harder and C. B. Voldrich, Battelle Memorial Institute.

Evaluation of Weldability by Correlation of Electrical Constants, by Victor Paschkis, Columbia University.

7:30 p. m.—Educational Session

General Electric Film on Atomic Hydrogen Welding.

An address on Welding in Ordnance Construction, by Col. S. B. Ritchie, Chief of the Service Branch of the Chief of Ordnance Office.

Tuesday, October 19

9:30 a. m.—Session on Resistance Welding

Flash Welding of Alloy Steels, by C. M. Manzer, General Electric Co.

(*Turn to page* 82, *please*)

PROGRAM OF WIRE ASSOCIATION

Headquarters at La Salle Hotel

Monday, October 18

10:30 a. m.—Directors' Meeting

12:30 p. m.—Directors' Luncheon to Program Committee and Speakers

2:30 p. m.—Technical Session

Designing Mills for Government Purposes, by Paul M. Mueller, Revere Copper and Brass Co.

Tuesday, October 19

10:00 a. m. Technical Session

Work Simplification, by Mogensen (Lecture and Motion Picture).

Steel Rope Wire Drawing Practices, by John C. Aiken, Jones & Laughlin Steel Corp.

2:30 p. m.—Technical Session

The Use of Lead Base Coatings as a Substitute for Zinc, by C. A. Kellogg, Continental Steel Corp.

Plating of Steel Wire, by Rodman R. Tatnall, Wickwire Spencer Steel Co.

Wednesday, October 20

10:00—Technical Session

Mordica Memorial Lecture, by Flint C. Elder, American Steel & Wire Co.

12:30 p. m.—Wire Association Luncheon

Speaker—Capt. A. J. Wellings, Chief of Navy Material Inspection, Navy Department.

4:00 p. m.—Wire Association Annual Meeting

7:00 p. m.—Annual Smoker-Dinner

Thursday, October 21

10:00 a. m.—Technical Session

Drawing of Fibers, by Sydney Coppick.

Properties and Uses of Vinyl Resins for Wire and Cable, by G. A. Fowles, B. F. Goodrich Co.

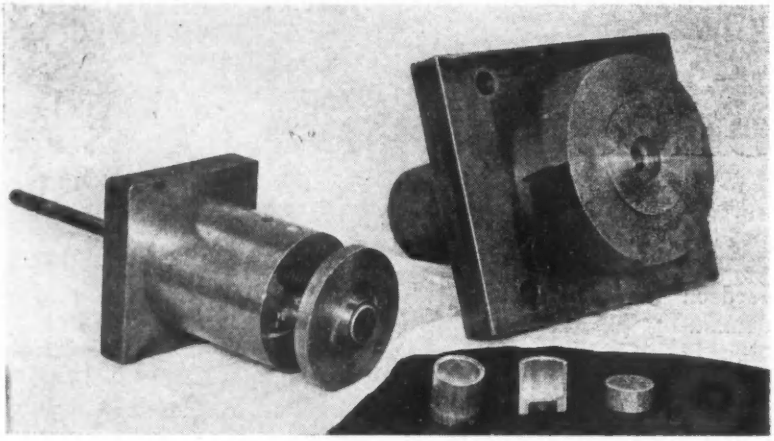
2:30 p. m.—Technical Session

Glass Insulation; Its Uses and Properties, by L. T. Russell, Owens-Corning Fiberglas Corp.

The Application of Synthetic Compounds to Wire by Extrusion, by H. K. Intemann, Halowax Products Div., Union Carbide & Carbon Corp.

Rubber in Industry—Motion Picture.

Impact E



Impact extrusion die for producing the ammunition feed roller. In the foreground are shown a roller, a cross-section of the part and the blank for making it. A cutaway view of the die setup is shown in Fig. 1.

FOR many years certain articles such as collapsible tubes for tooth paste, etc., have been made of tin, lead, and other soft metals by the impact-extrusion process. By this process, a single press stroke changes a slug or blank of metal into the completed article. The high pressure developed causes the cold metal to flow to the desired shape. Many airplane parts which normally are produced by casting, forging, or machining from solid stock could be produced more quickly and economically by the impact-extrusion process.

Aluminum and aluminum alloys can be extruded by this method. Any type of press can be used. Small parts can be produced in multiple dies, to increase production. It has been found that aluminum requires a pressure of approximately 90,000 psi, while aluminum alloy No. 24 requires approximately 180,000 psi. Impact-extrusion can be used to advantage for many parts now made by the drop-hammer process, and the increasing difficulty experienced in getting forgings should hasten its adoption.

The dies must be properly heat-treated and must have sufficient strength to withstand the extreme pressures and impacts. During the flow period, owing to the high pressure between the die and the flowing metal, there is considerable friction at the contact surfaces, and wear must be expected. It has been found

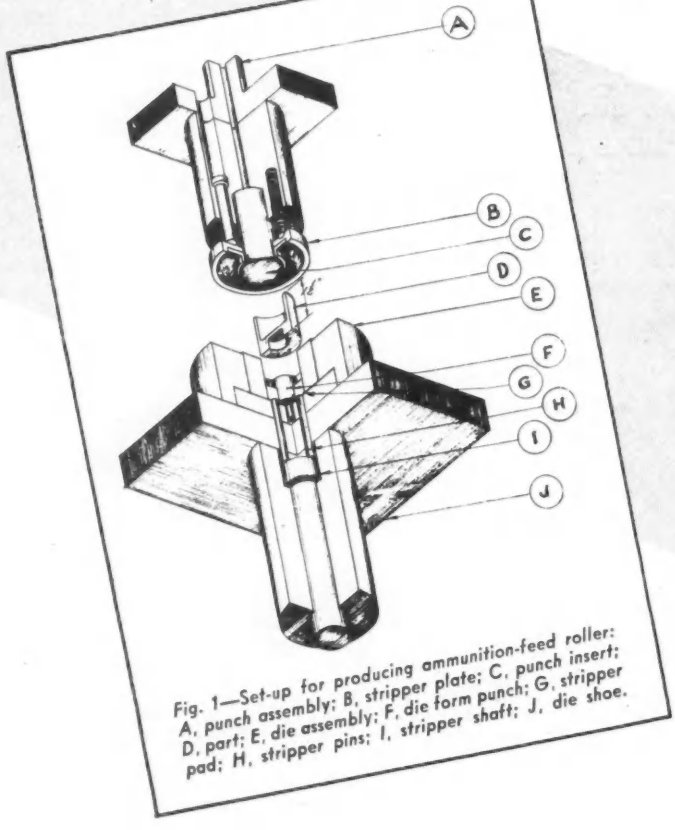


Fig. 1—Set-up for producing ammunition-feed roller: A, punch assembly; B, stripper plate; C, punch insert; D, part; E, die assembly; F, die form punch; G, stripper pad; H, stripper pins; I, stripper shaft; J, die shoe.

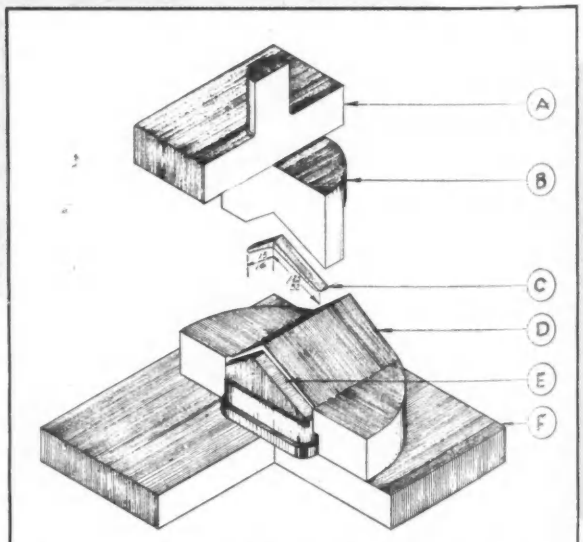


Fig. 2—Set-up for coining bent bar: A, punch holder; B, punch; C, part; D, die; E, die insert; F, die plate.

By Phil Koenig
Supervisor of Tooling,
New Orleans Div., Consolidated Vultee Aircraft Corp.

Extrusion and Cold Pressing of Aluminum Parts

that chromium-plating lengthens the life of the dies materially.

Advantages of this method of production can be summarized as follows:

1. The density of the metal is considerably increased.

2. Tool costs are relatively low, the dies required being easy to machine.

3. Extremely high accuracy is obtained automatically.

4. There are no definite limitations on the form or shape of the parts which can be produced. Where the parts must have holes or openings in them, it is sometimes best to drill, punch or otherwise produce these after the part has been completed otherwise; alternately, the hole or opening can be made in the slug. Care must be taken to prevent the metal being formed from being forced into the clearance spaces between the die body and the knock-out plunger. The high pressures involved necessitate close fits.

5. Secondary operations can greatly broaden the field of this method of production.

6. Thermal methods can be used to supplement the strain-hardening brought about by this method.

7. Complicated designs and shapes can be produced which would be very difficult, if not impossible, to produce by any other method.

Fig. 1 shows a die and the part to be produced by it—a roller on the ammunition feed. The material used is 1½-in. aluminum alloy bar in the soft condition. The stock is cut to the required developed length on an automatic screw machine, the blanks are placed in the die, and with a single stroke of the press are converted into a completed part, except that a ¾-in. hole must be drilled and the end faced in a turret lathe. Approximately 55 per cent less material is required than if the part were turned from the solid on a turret lathe. If the part is completely machined on the turret lathe it requires 25 sec., while when formed by the impact-extrusion process and finished on a turret lathe it takes only 20 sec. Variations in the diameter of the bore, (which is specified as 0.9024, plus 0.001, minus zero) are much smaller if the part is produced by the impact-extrusion method than when it is completely machined.

The die shown in Fig. 2 may be called either an impact-extrusion or a coining die. This was the first die to be made, and considerable difficulty was experienced in its development. The first one made was not strong enough, and there was too much clearance between the die and the knock-out piece, which resulted in excessive flash. When Alclad was tried, most of the aluminum was forced into the radius of the inner corner, which weakened the part considerably. Flat stock was first tried, and in confining the metal in an effort to obtain semi-sharp outer corners, cold shuts at the inner radius resulted.

In cases of this kind, consideration should be

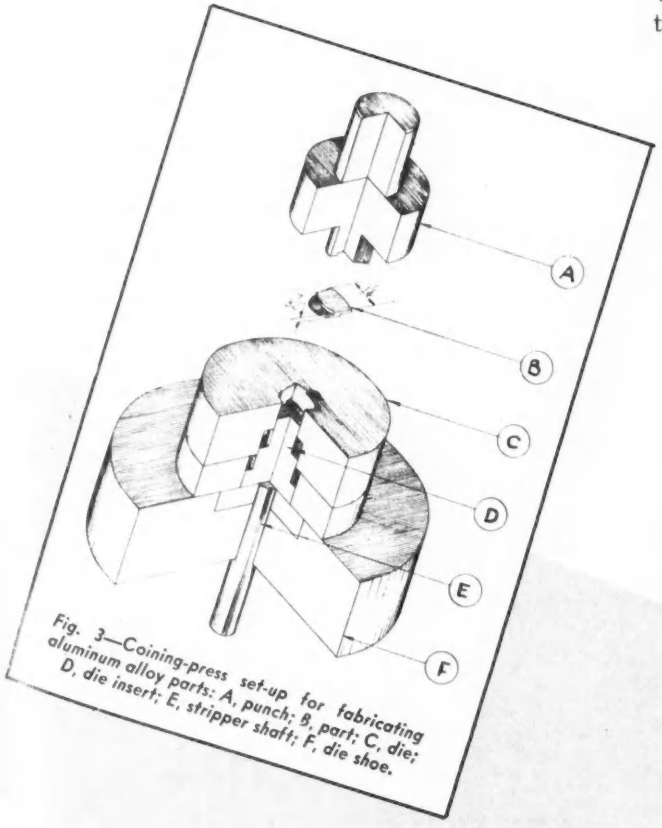


Fig. 3—Coining-press set-up for fabricating aluminum alloy parts: A, punch; B, part; C, die; D, die insert; E, stripper shaft; F, die shoe.

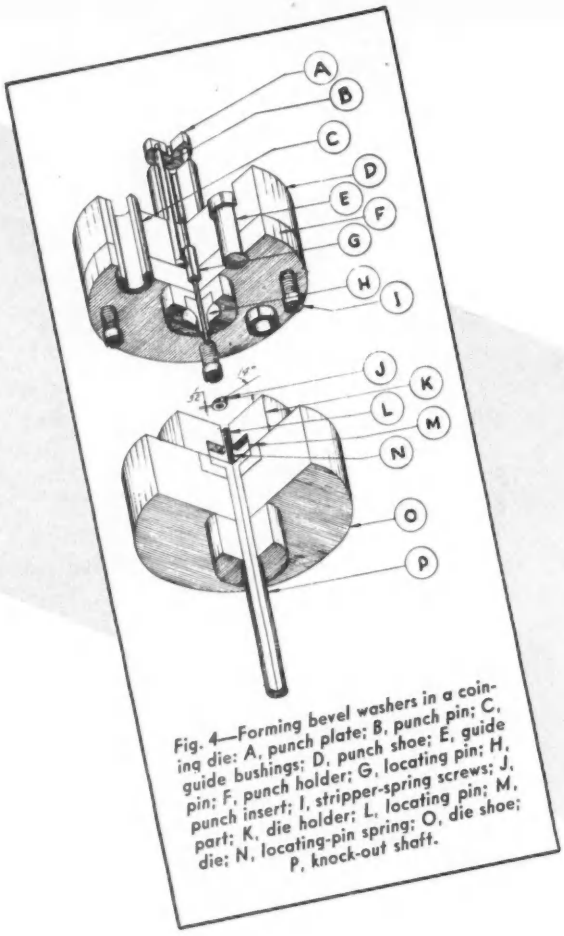


Fig. 4—Forming bevel washers in a coining die: A, punch plate; B, punch pin; C, guide bushings; D, punch shoe; E, guide pin; F, punch holder; G, locating pin; H, punch insert; I, stripper-spring screws; J, part; K, die holder; L, locating pin; M, die; N, locating-pin spring; O, die shoe; P, knock-out shaft.

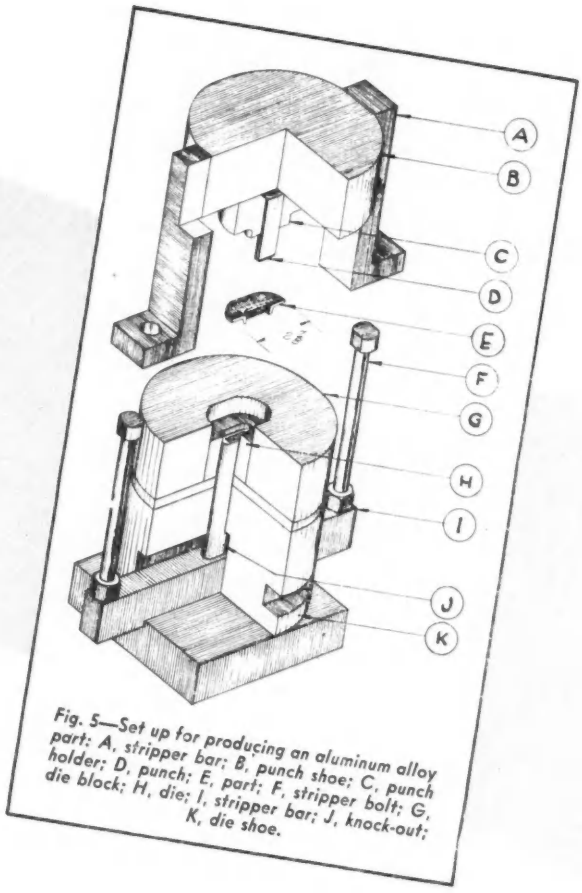


Fig. 5—Set up for producing an aluminum alloy part: A, stripper bar; B, punch shoe; C, punch holder; D, punch; E, part; F, stripper bolt; G, die block; H, die; I, stripper bar; J, knock-out; K, die shoe.

given to the distribution of metal, the same as in drop-forging practice. There a first die or "fuller" is sometimes required to produce metal distribution that will ensure filling the roughing and finishing impressions of the dies. For this impact-extruded part the slug should have a cross section at least equal to the thickness of the finished part; that is, the distance from the corner to the fillet. When a slug of round stock of ample diameter was used, the metal flowed in both directions and perfect parts resulted.

Fig. 3 shows a coin-press die for fabricating parts of 24S aluminum alloy. This process involves three operations—blanking, coining and drilling. As compared with the old process of blanking, two separate turning operations, and drilling, it saves considerable time, gives more accurate parts, and requires only unskilled help. This is an example of a true coining die. There is no overflow of metal, and the blanks therefore must be of the proper thickness and hardness, as any deviation will result in die breakage.

Fig. 4 shows a true coining die for producing beveled washers. First a flat washer is made by blanking and piercing on a standard washer die. The inside and outside diameters are not particularly important, as the size of the finished washer can be controlled by the stock thickness. The coining die converts these blanks into bevel washers in a single operation that produces uniform and accurate parts.

In Fig. 5 is shown an impact-extrusion die for producing a part of 24S alloy that would otherwise be drop-forged. With this production method the important dimensions are held to very close tolerances without increase in production cost. A part of this kind requires no machining, except if holes are required, or possibly at the end of the elongated section, which is the portion that would be influenced by any excess metal in the slug.

At the Front

They Keep on Fighting

At Home

You Keep on Buying

WAR BONDS

Howard Coonley Points Out a Critical Situation

Howard Coonley, Director Conservation Division, War Production Board, stresses the critical cutting tool shortage situation in a letter to all industry. Here is what he says—

> "--the cutting tool situation is now so acute...that the War Production Board has launched an intensive campaign to establish definite tool care policies in as many plants as possible."

Conservation of cutting tools is sound practice, good business—at any time. Today it is of vital importance to conserve tools in order to meet the full demands for war production. Cutting tool control and usage methods established under peacetime conditions should be reviewed—stepped up to wartime requirements.

Help increase war output, help bring Victory closer, by conserving cutting tools—"they are weapons, treat 'em right."

INLAND STEEL COMPANY

38 S. Dearborn St. — 50th ANNIVERSARY — Chicago 3, Illinois

Milwaukee Detroit St. Paul St. Louis Kansas City Cincinnati New York

New Production Equipment

A NEW instrument for precision measuring of both internal and external dimensions held to very close tolerances has been developed by The Sheffield Corporation, Dayton, Ohio. As an internal dimension comparator this instrument can be used for checking master and working ring gages, for setting snap and length gages, and for other similar high precision work. It will check diameters or other internal dimensions from ¾ in. to 12 in. and explore a hole to a depth of 3 in. An open hole may be checked to a depth of 3 in. from one side, the piece turned over, and an additional check of 3 in. made from the other side, or a total of 6 in. Taper, bell-mouth and out-of-round conditions can be discovered and measured.

Sheffield measuring instrument

When used as an external comparator it will check rounds, straights and tapers within a maximum dimension of 12 in. This is said to be one of the few instruments on which the small diameter of a taper can be easily and precisely checked.

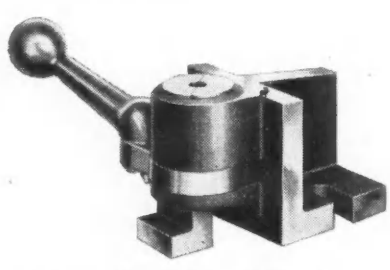
The gaging arms are raised and lowered by an electrical mechanism operated by two push-buttons. Automatic stops prevent the arms from raising or lowering beyond 3 in. range limits. A direct-reading visual counter, graduated in hundredths of an inch, serves as an automatic height indicator, showing at all times the heighth of the gaging arms above the lapped table surface.

The Sheffield electric gaging head provides a new and different type of electrical magnification, 2500 to 1. The scale of the Electrigage has a range of .0012 in. and is graduated in 50-millionths of an inch (.000050 in.). These graduations are spaced far enough apart so that interpolated readings of approximately .0000125 in. are possible.

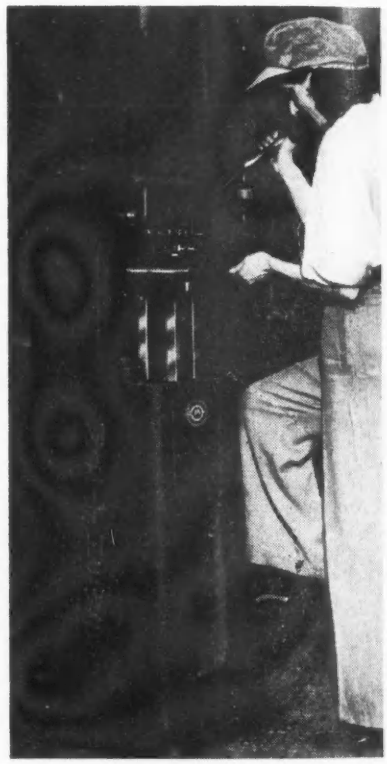
THE Matthews No. 204 General Purpose Marking Machine is used for marking of part numbers, patent numbers, names, coding, trade-marks, and special lettering or designs on a range of shapes and sizes of parts up to 6 in. in diameter or thickness. Flat parts are marked by means of solid roller dies or mortised roller dies and interchangeable segment type. Round parts are marked with flat dies or interchangeable steel type.

The operator's position is always in front of the machine, in full view of the work. The part to be marked is placed into a suitable fixture, fastened to the table of the machine. The foot treadle is then depressed, which raises the table and brings the part into contact with the marking die. The handle is then pulled downward, which causes the die to move across the part, rolling in the mark. The die stroke is 3½ in. on round parts or 4½ in. on flat parts.

A pneumatic air cylinder can be installed in the standard No. 204 machine for greater ease of operation, or when round parts only are to be marked a motorized head can be substituted for the standard head.



Wayne Collet Chucking Fixture

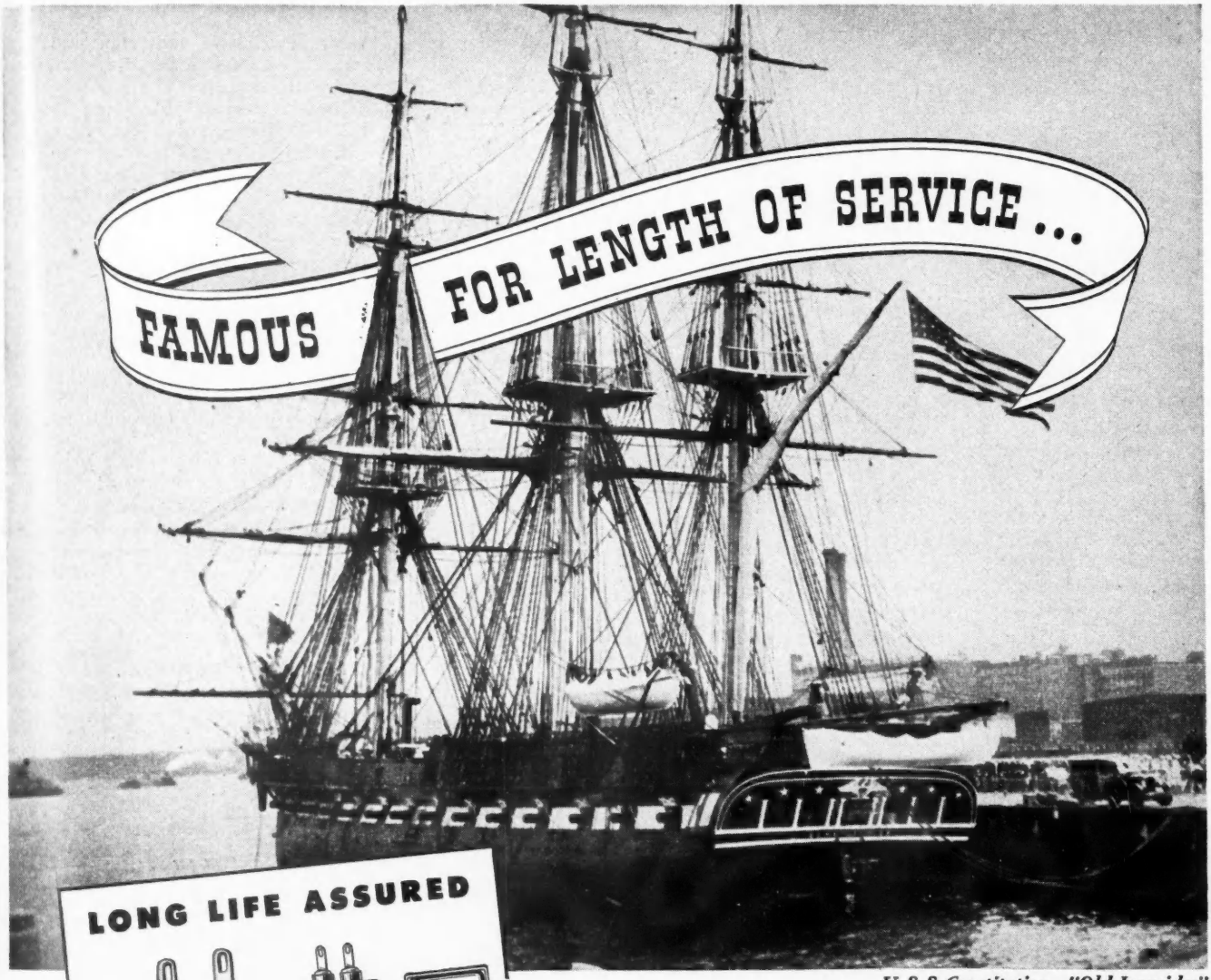


Matthews No. 204 General Purpose Marking Machine.

THE Wayne Collet Chucking Fixture, which has just been introduced by The Wayne Pump Company, Fort Wayne, Ind., provides a convenient means of holding stock in machine operations. It is furnished with unhardened and undrilled four jaw collets to permit drilling to exact specifications. Extra sets of jaws may be purchased and kept on hand, ready for any special job. For short runs, cold rolled steel jaws are used; for longer runs, tool steel jaws are used and are hardened after the hole is bored. The manufacturer recommends drilling the collet with the fixture fastened to the machine on which it is to be used to insure accurate alignment with the spindle of the machine.

The fixture holds stock up to 1 in. in diameter, and stock up to 9/16 in. will pass through the collet. Pressing a button releases the handle so that it may be located in the most convenient position. All surfaces of the fixture are machined so that it may be used in several different positions.

(*Turn to page* 86, *please*)



U. S. S. Constitution—"Old Ironsides"

LONG LIFE ASSURED

The new separate mounting is stronger and prevents oil leaks caused by breaks in can. This modern design takes the minimum of space.

TYPE	OM
RATINGS	.05 to 2.0 mfd. 600 V.D.C. .05 mfd. to 1.0 mfd. 1,000 V.D.C.
STANDARD CAPACITY TOLERANCE.	±10%
TEST VOLTAGE	Twice D.C. rating
GROUND TEST	2,500 Volts, D.C.
SHUNT RESISTANCE	.05 to 0.1 mfd. 20,000 megohms. .25 to 0.5 mfd. 12,000 megohms. 1.0 to 2.0 mfd. 12,000 megohms.
POWER FACTOR	At 1,000 cycles—.002 to .005
CONTAINER SIZE	Width 5/8", length 1-5/16", height 2¼"
MOUNTING HOLE CENTERS	1½"

YOU WANT capacitors that can stand up and take it. The well-nigh flawless record of Tobe Capacitors as to "returns" proves they have that outstanding requirement of durability.

This quality is built into each and every Tobe Capacitor by advanced engineering practices and production methods. And their rating is always an "understatement".

Shown here is the Tobe Oilmite Capacitor. Filled and impregnated with mineral oil it is used as a filter condenser in war equipment. The new hold-down bracket permits inverted or upright terminals, with wiring either underneath or on top of chassis.

TOBE DEUTSCHMANN CORP.
TOBE
CANTON · MASSACHUSETTS

A SMALL PART IN VICTORY TODAY—A BIG PART IN INDUSTRY TOMORROW

Airbriefs

By Henry Lowe Brownback

Prophecy

Last month we talked of ballooning in the Civil War, and it might be very interesting to most of the readers of Airbriefs to know that one of the original enthusiasts about the possibilities of air travel was Benjamin Franklin, who witnessed a great many of the early French flights while ambassador from this country to France, and wrote a great many letters to our Government outlining what he thought would be the uses of balloons. He not only envisaged balloon observation, but wrote the following to Jan Ingenhousz, physician to the Empress Maria Therese, in Vienna:

"It appears, as you observe, to be a discovery of great Importance and what may possibly give a new turn to human Affairs. Convincing Sovereigns of the Folly of wars may, perhaps, be one Effect of it, since it will be impracticable for the most potent of them to guard his Dominions. Five thousand Balloons, capable of raising two Men each, could not cost more than Five Ships of the Line; and where is the Prince who can afford so to cover his Country with Troops for its Defense, as that Ten Thousand Men descending from the Clouds might not in many places do an infinite deal of mischief before a Force could be brought together to repel them?"

Mind you, this prophesy was made in 1783, and today we are using exactly the tactics which Franklin envisaged, but in doing so we are using parachute troops and gliders instead of free balloons. Thus it seems a study into some of the sayings of the wise men of the past can do much to solve our troubles of the present.

Fire Extinguishers

I recently read over a report on a CAA project for means of detecting and extinguishing fires in flight by using carbon dioxide gas. Lack of progress in matters of this sort are surprising in view of the developments of fire extinguishing on airplanes in foreign countries, particularly in France where the installation of carbon dioxide extinguishers automatically controlled by fusible plugs has been compulsory for years. With the return of peacetimes our policy-making bodies should be compelled to become intimately conversant with every technical advance made in foreign countries rather than ignoring them completely and sitting back waiting for a bright idea to strike them, which might have been tried years before somewhere else.

Americans are an extremely versatile people, and certainly the world's leaders in mass producing articles of every kind, giving high quality at low prices. However, the fact that we can only see things in great numbers makes us one of the least inventive peoples of the world, many of the Europeans leading us in almost every field of endeavor, as they have to make so few things alike that they can make constant changes without enormous tooling costs. A balance between invention and production can be maintained by building a few handmade things which are constantly changed and sold at high prices by one division and later utilizing the advances made, en masse, by another division. Constant changes in aviation have played hob with production schedules, but have permitted the rapid advances which have been made.

New Materials

We are constantly hearing of new substances destined to supersede materials which we have used in the past, not only for non-essential parts but for structural members. Among these different materials the plastics have held a prominent place, some predictions going so far as to envisage entire structures made from molded plastic.

Certainly the war effort has advanced research in a great many lines, accelerating the pace so that a month of war equals a year of peacetime advance. However, this has one disadvantage, namely that the materials being developed, while they may be perfectly suitable for a great many things over a period of months, may not last over a period of years, and thus while they may be entirely satisfactory at a first glance might become very dangerous when used over a period of time longer than that used in testing it. For instance, one knows pretty well how long a piece of bronze or steel, or even wood will serve under a given loading, but probably does not know how long a piece of plastic material will serve under the same loading, and accelerated tests will not always furnish the proof, as obscure chemical reactions may take place in these newer materials which will tend to destroy them as time passes on. I have in mind a problem in an allied field where an enthusiastic purchaser requested a marine architect to design him a boat made of a certain new material. The marine architect refused, on the ground that he did not believe the material would last a sufficient length of time to make it worth while. Whereupon his client explained that he had seen a small boat built of the same material which was in perfect condition at the end of ten months, while the architect had twenty or thirty years in mind.

Certainly the progress of new materials should not be held back by ultra conservatism, but one should not go the other way and injure the new materials by using them before their qualities are known and then condemning them because they do not stand up as had been expected.

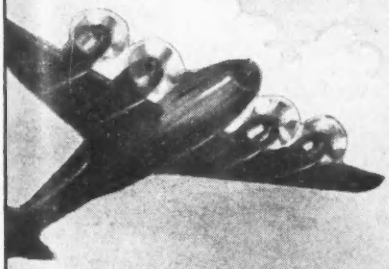
Bulk

While airplanes are designed to fly and to carry passengers and cargo, just as trains and motor cars are designed to carry passengers and cargo, still the question of the safety of passengers in case of accident must receive a great amount of consideration. Railway safety and motor car safety were greatly enhanced by the introduction of all-steel bodies which protected the passengers in case of a crash. However, in considering material for airplanes the question of bulk must be kept in mind, as materials which are so heavy that they have to be used in extremely thin sections can become very dangerous in case of accident, as they may break up, becoming a mass of razor-bladelike cutting surfaces which mutilate rather than protect. This seems to indicate that the types of materials which will be used in the construction of future airplanes will vary with the size of the plane, and that in a great many cases composite structures of some kind will be preferable.

Jet Propulsion

While jet propulsion has formed the basis of many stories in fiction magazines, embodied in what most writers call rocket ships, its only successful application in actual aircraft has been that used in one Italian plane, and as a take off aid in several German planes. However, a new project has been quietly going on in which a helicopter is designed so that the reaction from jets located in the trailing edge or blades will turn the blades. Whether or not this will ever become practical is still in the field of conjecture, but it does present a possibility for thought.

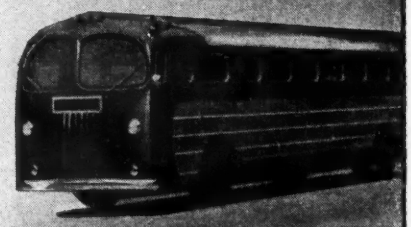
For pressure-tight... leak-proof unions!



Pressure-tight and leak-proof assemblies are of vital importance to the efficiency and proper maintenance of trucks, buses, planes, tanks, tractors, boats, diesel engines, pumps, pipelines and industrial machinery.

Permatex Form-A-Gasket No. 1 . . . Form-A-Gasket No. 2 . . . Aviation Form-A-Gasket and Pipe Joint Cement are as important as tools a mechanic uses to do the right job on gasket assemblies, flange unions, threaded connections, pipe joints and many other assemblies.

These Permatex sealing compounds are leak-proof to gasoline, kerosene, fuel oil, hot or cold lubricants, hot or cold water, salt water, illuminating gas, ethylene glycol, glycerine and numerous other liquids and gases.

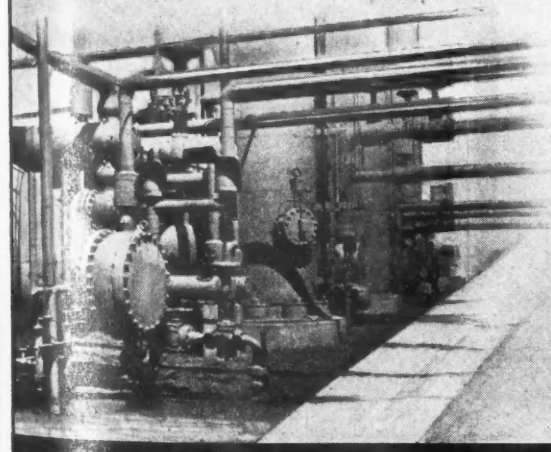


Permatex Form-A-Gasket No. 1 is a soft paste that dries fast and sets hard.

Permatex Form-A-Gasket No. 2 is a soft paste that dries slowly and remains pliable.

Permatex Aviation Form-A-Gasket is a heavy liquid that does not dry and does not run. Readily brushable and self-levelling.

Permatex Pipe Joint Cement is a heavy liquid that does not dry or crack. Applied with a brush. Permits easy readjustment. Disassembles readily.

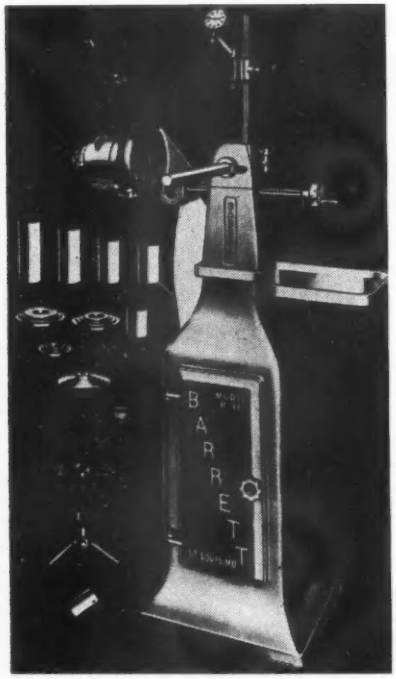


PERMATEX COMPANY, INC.
Sheepshead Bay, N.Y., U.S.A.

New Products for Aircraft

Brake Service Tool for Aircraft

The Barrett Model B-117 Aircraft Brake Dokter which has just been introduced by the Barrett Equipment Co., St. Louis, Mo., can be used to service aircraft brakes while in place on the landing gear, in the hanger, on the field, or on the production line. It is a machine that grinds the lining and



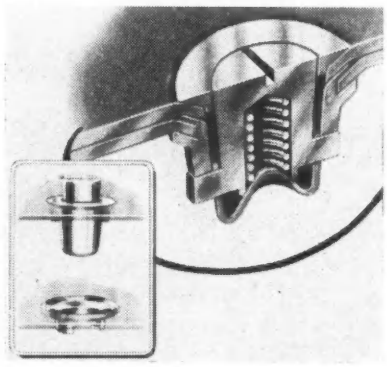
Barrett Aircraft Brake Dokter

adjusts the brake shoes to exact drum size with proper "drum to shoe" clearances allowed, so that no further adjustments are required after the drums are installed.

Where individual shoes are serviced, shoe fixtures are available, built to the brake manufacturer's specifications, enabling the operator to grind the relined shoes to the original factory drum size.

New Aircraft Fastener

A new fastener for aircraft cowlings, inspection plates, protective panels and similar uses has been developed by the Simmons Machine Tool Corporation, Albany, New York. It is known as the "Simlok Fastener," and features a helical-type spring which gives long spring travel. This



Simlok Fastener

reduces vibration and assures a tight, rigid fit, according to the manufacturer. In tension the load is not carried by the spring, but by hardened steel lugs. These eliminate the load on the spring, whose sole function is to hold the two parts of the fastener in a locked position.

The stud is self-ejecting when it is unlocked and consequently can be readily recognized by the aircraft mechanic as being in that position during repairs or reassembling work. The stud part is also locked semi-permanently in the outer sheet, and thus cannot be lost or mislaid during removal of the cowling. However, it can be quickly unlocked, if desired.

Double End Spline Milling Machine

Snyder Tool & Engineering Company, Detroit, Mich., has designed a new hydraulic double-end spline milling machine to cut two slots at a time, one on each side of the aircraft master rod illustrated on the tryout piece, inset.

The part is loaded and clamped on a manually indexing fixture having seven indexes. The fixture assembly is mounted on an adjustable, reciprocating table moving between solid stops for the length of the slots.

The two milling heads advance rapidly against hydraulically operated feed stop screws and feed into the work by steps which are adjustable from .005 in. to .060 in. per infeed stroke. During this milling operation the hydraulically operated, automatically reciprocating table maintains its transverse travel cycle, back and forth, thus establishing the length of the slots. This transverse table movement is adjustable for feed travel of one-half inch to ten inches per minute.

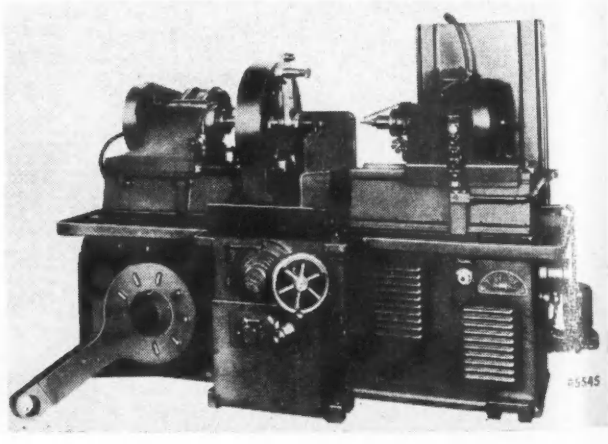
When the cutters have reached full depth, they are allowed to dwell in the work during several reciprocations in order to produce a clean finish in the slots.

Production rate is approximately three rods an hour, seven slots being cut on each side of each rod, a total of 42 slots an hour. Each slot measures 1⅛ in. by 7/16 in. by 7/16 in.

For set-up and try-out purposes, provision is made to control the infeed manually. Both manual and automatic infeed, per stroke, is indicated on the calibrated dial shown on the front of the machine beside the handwheel.

The base of the machine is of welded steel construction and houses the bulk of the reciprocating and feed mechanism. Hydraulic equipment is housed separately in the rear of the machine as also is the coolant container.

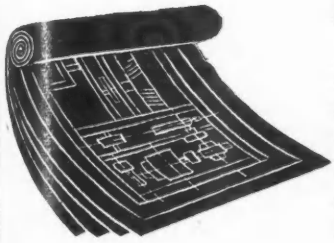
(*Turn to page* 102, *please*)



Snyder Hydraulic Double-end Spline Milling Machine

to help you

get the most out of STAINLESS STEEL



. . . Your engineers can use this information to take advantage of the high strength-weight ratio, corrosion resistance, wear resistance and permanence of Carpenter Stainless Steel. Of course, all Carpenter Stainless Steels could not be shown on a table of this size, so if you would like more information on the working properties of the various grades—or additional technical data—get in touch with us. Your nearby Carpenter representative will be glad to keep you in close touch with our Metallurgical Department, and supply helpful fabricating data.

TYPE OF PRODUCT	Carpenter Stainless Used and Analysis	Properties Provided by Stainless Grade—for a range of applications	RANGE OF PHYSICAL PROPERTIES*					OTHER RECOMMENDED USES
			TENSILE STRENGTH lbs. per sq. inch MAX./MIN.	HARDNESS MAX./MIN.	SPECIFIC GRAVITY	SCALING TEMPERATURE (Max. for continuous service)	IS IT MAGNETIC?	
SCREWS BOLTS RIVETS	No. 1 (Type 410) C. .10 Cr. 13.00	This stainless provides fair machining and good cold heading properties. It contains just enough chromium to yield truly "stainless" properties. It resists the corrosive effects of fresh water, gasoline, crude oil, alcohol, ammonia, etc.	190,000 / 80,000	Brinell 387 / 179	7.78	1200° F	Yes	Carpenter Stainless No. 1 is also used for springs, valve trim, pump shafts, and many heat treated parts. Available in forging billets, bars, wire, and strip.
COMBUSTION ENGINE PARTS	No. 2 (Type 420) C. .30 Cr. 13.00	Where extra hard stainless is needed for wear resistance, this grade is excellent. It is used for tempered parts that must be harder and stronger than parts made from No. 1. Its corrosion-resisting qualities are similar to those of No. 1.	260,000 / 90,000	Rockwell C 52 / 196 Brinell	7.75	1200° F	Yes	Used only in fully hardened condition for surgical and dental instruments, ball bearings, gears, shafts, cams, ball check valves, etc. Available in same forms as Carpenter Stainless No. 1.
CHEMICAL PROCESS EQUIPMENT	No. 3 (Type 442) C. .15 Cr. 20.00 Cu. 1.00	This stainless is easy to form, bend, blank or punch. In addition to providing corrosion resistance to salt water, practically all organic chemicals and acids, it has excellent heat resistance properties.	125,000 / 90,000	Rockwell C 28 / 187 Brinell	7.69	1600° F	Yes	No. 3 does not become embrittled by grain growth at high temperature—used for scale resisting purposes. Furnace parts, soot blowers, ladles for molten non-ferrous metal, etc. are made from it. Available in bars, forging billets, strip, wire and welded tubing.
OIL FIELD EQUIPMENT	No. 4 (Type 302) C. .10 Cr. 18.00 Ni. 8.00	This tough and ductile stainless responds easily to deep-drawing, blanking and forging. It has all the corrosion resistance of No. 1 and No. 3, plus resistance to dyes, foodstuffs, most organic chemicals and a wide variety of inorganic chemicals.	225,000 / 85,000	Rockwell C 43 / 160 Brinell	7.93	1600° F	No	Used extensively in form of cold rolled strip for stampings, springs, etc.—and in the form of wire for woven screens, dipping baskets, etc. Available in bars, forging billets, strip and wire.
INSTRUMENT PARTS	No. 5 (Type 416) C. .10 Cr. 13.50 S. .30	No. 5 machines in automatic screw machines about like SAE 1120. Cutting speeds between 125 and 200 surface feet per minute are common. This stainless resists the corrosive action of mercury, steam, crude oil, sugar solutions, mine water, etc.	164,000 / 80,000	Brinell 351 / 187	7.77	1200° F	Yes	A Free-Machining grade for parts made on automatic screw machines or machined from forgings—such as valve trim, pump shafts, hexagons for nuts, capscrews, and other hexagonal parts. Available in forging billets, bars and wire.
MOLDING and TRIM	No. 6 (Type 430) C. .10 Cr. 17.00	This stainless is extremely ductile for forming, drawing and stamping and lends itself readily to complicated press work. No. 6 resists the same corrosive elements as Carpenter Stainless No. 1—but with a greater factor of safety.	125,000 / 70,000	Rockwell C 25 / 150 Brinell	7.71	1300° F	Yes	Used in the form of cold rolled strip for making stampings, etc. In the form of cold drawn wire for woven screens, screws, bolts, rivets, and other cold headed products. Available in bars, forging billets, strip and wire.
SCREW MACHINE PARTS	No. 8 (Type 303) C. .10 Cr. 18.00 Ni. 8.00 Se. .25	When machining is involved, this stainless is generally used instead of No. 4. This type provides the same general corrosion resistance properties, and is Free-Machining.	150,000 / 85,000	Rockwell C 35 / 160 Brinell	7.93	1600° F	No	A Free-Machining grade for use in automatic screw machines or forgings to be machined. Recommended for parts requiring greater corrosion resistance than Carpenter Stainless No. 5. Available in same forms as No. 6.

*NOTE: Physical properties depend upon form, heat treatment or cold working. Slightly wider ranges of properties are possible in certain forms. Take up your special problems with our Metallurgical Department.

For further design-engineering and fabricating information, ask for a copy of "Working Data for Carpenter Stainless Steels". This 98-page book is made available to help you select the best Stainless for today's or tomorrow's products. A note on your company letterhead will start your copy on its way. Drop us a line today.

THE CARPENTER STEEL COMPANY • 103 BERN ST., READING, PA.

Carpenter STAINLESS STEELS

Aero Body Formulates Policies for War Contract Problems

Renegotiation, Contract Termination, Surplus Aircraft and Defense Plants Studied at Aeronautical C. of C. Meeting

Having for its objective a unified and sound aviation industry as an integral part of the national economy, definite progress was made in that direction by the Economic Development Committee of the Aeronautical Chamber of Commerce of America when it held its first annual meeting last month at Colorado Springs, Colo. This committee, which is composed of representatives of ACCA member companies, was created recently to consider business problems confronting the aeronautical manufacturing industry of this country, including industry cooperation in the war effort and the development of peacetime markets for aeronautical products.

In attendance during the three-day meeting were representatives of more than 50 companies now manufacturing the nation's warplanes and equipment for them. S. W. Voorhes, of Lockheed, was elected permanent chairman of the committee, and Irving H. Taylor, of Douglas, vice-chairman. To qualify as chairman or vice-chairman, the rules of organization provide that one of the elected officials must be located in Washington, D. C., or nearby, a requirement met by Mr. Taylor. Taking an active part in the meeting were President James P. Murray, Manager J. H. Payne, of Economic Development Dept., and many other officials of the ACCA.

With their plant facilities well organized for volume production of warplanes, the company executives were able to devote most of their time to a study of important economic questions now confronting the aviation industry, consisting chiefly of problems posed by Government agencies and those arising from the industry's all-out participation in the war effort. For the informal discussions the problems were divided into three classifications—large range projects, short range projects and statistical projects.

At the short range projects sessions, of which Robert B. Lea, Sperry Gyroscope Company, was chairman, the informal discussions were devoted to war contract termination, renegotiation of war contracts, and the use and disposition of surplus Government-owned aircraft and defense plants after the war. H. W. Cohu, of Northrup, had charge of the long range projects sessions, at which legislative regulations, local feeder and pick-up air service and the outlook for the post-war export market and private plane market were considered. At the statistical projects session, which was presided over by Charles W. Loos, Curtiss-Wright Corp., in the absence of James C. Willson, the chairman, plans were made for the dissemination of statistical aviation data and for the coordination of statistical information on special research projects.

During the meeting the Economic Development Council was organized with a membership of 15 members, who will function as the working and executive body of the Economic Development Committee. The Council members are:

S. E. Voorhes, assistant to the president of Lockheed Aircraft Corp., chairman; Irving H. Taylor, Douglas Aircraft Corp., vice-chairman; Ira G. Snader, vice-president of Aviation Corp.; L. A. Hyland, assistant to vice-president of Bendix Aviation Corp.; James P. Murray, vice-president of Boeing Aircraft Co.; Don Flower, sales manager of Cessna Aircraft Corp.; J. C. Willson, director of Curtiss-Wright Corp.; P. A. Hewlett, Consolidated Vultee Aircraft Corp.; Joseph T. Geuting, vice-president of General Aircraft Corp.; J. Story Smith, vice-president of Jacobs Aircraft Engine Co.; R. E. Davis, assistant to vice-president of Goodyear Tire and Rubber Co.; L. L. Snow, Pratt & Whitney Div. of United Aircraft Corp.; A. T. Hapke, Jr., Republic Aviation Corp.; Robert B. Lea, vice-president of Sperry Gyroscope Co.; H. W. Cohu, Northrup Aircraft.

The committee endorsed the recommendations for amendment and revision of the war contract renegotiation law presented Sept. 16 and 17 to the House Ways and Means Committee by Ralph S. Damon, vice-president of American Airlines, on behalf of the East Coast aircraft manufacturers, and by Francis

(*Turn to page 90, please*)

The Master Key

"To provide millions of new jobs, billions of dollars must be invested in enterprise. Capital markets must be roused from their semi-comatose condition. Confidence must be restored in the investor and business risks made worth while. * * *

"We need the solid meat of enterprise, with its vitamins of thrift and competition. We need the milk of ambition and hope, with its calcium and phosphorus of adventure and risk. We need the stimulating ferments of the wine of clashing ideas!

"To realize the four freedoms, we need only one freedom — Freedom! — From "The Spirit of Enterprise" by Edgar M. Queeny.

SAVING HORSE-POWER TO SAVE FREEDOM!

Boiled right down to basic facts, it's horsepower of a hundred kinds that's deciding this war . . . horsepower giving mobility and meaning to the firepower in the hands of the American fighting man, who grew up with his foot on a throttle.

An unconquerable combination—American men and motors! It's an honor and an inspiration to every Sealed Power man and woman to serve every branch of our armed forces with the products that have won the trust of peace-time America.

SCRAP METAL IS NEEDED FOR EVERY GUN, TANK AND SHIP. SEND *YOUR* SCRAP TO WAR.

SEALED POWER CORPORATION

MUSKEGON, MICHIGAN • WINDSOR, ONTARIO

SEALED POWER PISTON RINGS

PISTON RINGS—PISTONS—CYLINDER SLEEVES

Fighting Airport Fires

WITH SKF BEARINGS

● *Built by* AMERICAN-LAFRANCE-FOAMITE CORP.

Not only are SKF Bearings *friction fighters*, but they're *fire fighters*, too. Let the alarm sound that there's a spill fire on the apron while a plane is warming up . . . or a blaze in the hangar . . . and SKF's ride with this apparatus and its 750-gallon, 2-stage Centra-flow pump. Every SKF's alert . . . making sure the shafts are rolling freely . . . taking radial and thrust loads easily . . . assuring instant response. Whether they're fighting Friction or fire, they're on the job . . . always. 5383

Tips
ON BEARING CARE
To make present equipment last longer
1. Use clean lubricant recommended by the manufacturer of this machine.
2. Avoid loads and speeds beyond those recommended by the manufacturer.
3. Check wiring and insulation frequently. Short circuits or stray currents can damage bearings.
4. If necessary to remove bearings, keep them properly lubricated. Avoid the intrusion of water and dirt. Apply pressure on the inner race only. Don't hammer outer race.
SKF

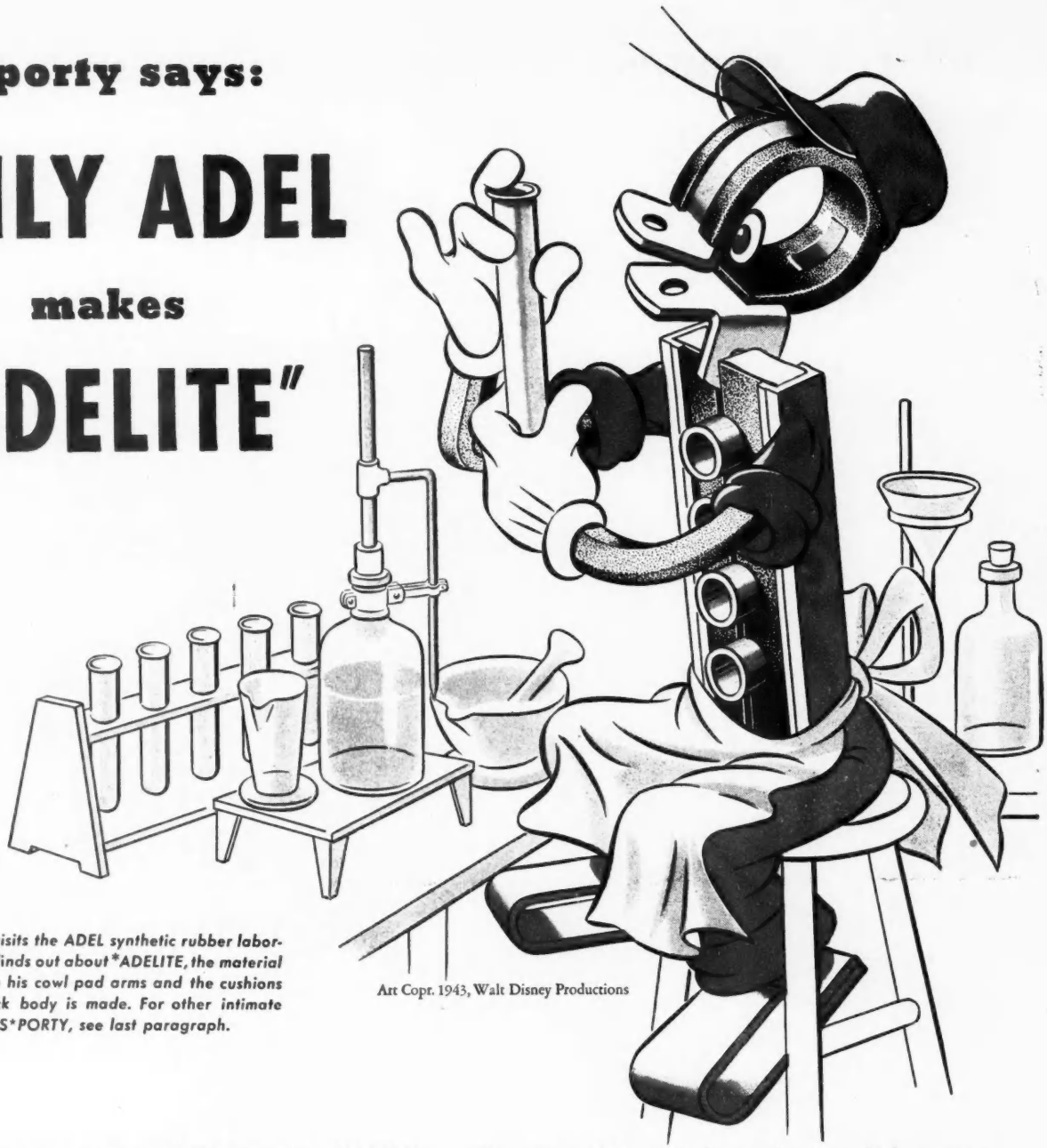
ARMY E NAVY

SKF
BALL AND ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILA., PA.

S*porty says:

'ONLY ADEL makes *ADELITE"



*S*PORTY visits the ADEL synthetic rubber laboratory and finds out about *ADELITE, the material from which his cowl pad arms and the cushions of his block body is made. For other intimate details on S*PORTY, see last paragraph.*

Art Copr. 1943, Walt Disney Productions

"There's only one genuine *ADELITE," says S*PORTY, "and it's made by ADEL." Designed by aeronautical engineers for aircraft installations, *ADELITE has had years of commercial air line and military combat service testing under every conceivable flight condition from Kiska cold to Munda heat.

*ADELITE is light, tough, durable—and here's why: Weight, .032 to .037 pounds per cubic inch, ⅛ lighter! Hardness, normal 35 to 45 Shore Durometer; available up to 75. Resistance to salt water, oil, gasoline, hydraulic and similar fluids compares with conventional synthetic rubber! Stands up against compression-set. Specified by cost-conscious air lines and used on nearly all American and Canadian aircraft.

You can get it in stock sheets of various thicknesses or have it molded and cut to standard or special requirements. Use it for tank cushioning, cowl pads wing walks, cat walks and every installation calling for positive insulation against heat, electricity, vibration and sound. ADEL ENGINEERS in eight U. S. and Canadian service offices will give you complete information.

Anatomically speaking, S*PORTY'S head is a 766 clip, his feet are 440 clips and his body is an A800 line support block. 10,000 production types and sizes of ADEL line supports are manufactured under United States Letter Patent Nos. 2,215,283; 2,227,528; 2,279,865; 2,279,866; 2,288,158; 2,291,887; 2,310,622. Other U.S. and foreign patents pending.

ADEL

PRECISION PRODUCTS CORP.

Burbank, California
Huntington, W. Va.

BACK THE ATTACK WITH WAR BONDS!

10777 Van Owen Street, BURBANK, CALIF. • 1411 Fourth Avenue, SEATTLE 1, WASH. • Admin. Bldg., Love Field, DALLAS 9, TEXAS • 6560 Cass Avenue, DETROIT 2, MICH. 421 Mutual Home Building, DAYTON, OHIO • 1444 Washington, HUNTINGTON, W. VA. • 303 Wareham Building, HAGERSTOWN, MD. • 302 Bay Street, TORONTO, ONTARIO

Copyright 1943, Adel Precision Products Corp.

*Trademark Registered U. S. Pat Off.

UAW-CIO Membership Nearly Doubled During Past Year

In the Four-Year Period Ended June 30, 1943, the UAW-CIO Received 62½% of Votes in NLRB Elections

Nearly doubling its membership in a year's time, the UAW-CIO boasted 1,077,889 dues paying members in July, a gain of 91 per cent over July, 1942. This was revealed in the annual report of President R. J. Thomas to the union's convention at Buffalo. Average monthly membership for the 14 months ending June 30, 1943, was 715,382, a tremendous advance over the pre-war monthly average of 292,091 for the year ending April 30, 1941, and dwarfing the average of 120,795 members for the year ending June 30, 1937.

During the year ending June 30, 1943, the UAW-CIO was on the ballot in 368 NLRB elections and it won certification as the bargaining agent in 272 cases, or 74 per cent. The AFL won 24 elections, or 7 per cent, and unaffiliated unions captured 22, or 6 per cent. In the remaining 50 cases, or 13 per cent, they voted for "no union." On the basis of total ballots cast, the UAW-CIO received 114,804, or 56 per cent of the 203,765 votes cast. The AFL tallied 26,720 votes, or 13 per cent of the total. In the four-year period from July 1, 1939, to June 30, 1943, the UAW-CIO has received 62½ per cent of the 719,951 votes cast in NLRB elections. This totals 425,164 ballots compared to 102,803, or 14 per cent for the AFL. Independent unions polled 55,527 votes, or 7½ per cent and "no union" gained 119,890 votes, or 16 per cent. Thomas reported that 1473 plants are under contract with the UAW-CIO as of Aug. 15, a gain of 11 per cent over the 1328 plants under contract a year previously. Only 320 plants were under contract in 1939. An estimated 1,200,000 employes are covered by the present contracts.

With a view to carrying the union through the post-war period, George F. Addes, secretary-treasurer, recommended to the convention a "security assessment" of 50 cents per member for the duration only, believing that at least $5,000,000 in cash or liquid assets is necessary. As of June 30, the union had $1,622,622 on hand, of which $1,299,434 was in cash or government bonds.

Warning of the need to prepare for post-war re-conversion, Addes said, "When that time (for re-conversion) comes, the membership of our union will be harder hit than any union. Tens of thousands of our membership will be thrown out of work for an indefinite period, estimates running anywhere from four to 18 months. During this re-conversion period, income of the international union will drop in proportion to the layoff of membership. . . . An independent and confidential survey was recently made of a number of employers in an attempt to determine what their post-war wage policy was going to be. A surprisingly large percentage stated in no uncertain terms that they were going to do no bargaining whatsoever—that a fair (in their opinion) peace-time wage would be offered and that labor could take it or not as they pleased."

Total receipts of the UAW-CIO for the 14 months ending June 30 were $5,399,935, while expenditures totaled $4,607,908. Monthly receipts were up 31.7 per cent over the previous fiscal year. Expenses of organizing and servicing locals totaled $2,390,639, or 45 per cent of income. Organizational expense in the aircraft industry comprised 25.5 per cent of these expenditures, while 3.2 per cent went to the GM Dept., 2.8 per cent to Ford and 1 per cent to Chrysler. Most of the expenses of the union activities in the "Big Three" are borne by the locals. Two per cent of the organizing expense went towards the Thompson Products campaign in Cleveland. The UAW-

(*Turn to page* 146, *please*)

The CANNING SEASON has just begun

It started with a pickle-puss named Mussolini, who has a couple of buddies named Adolf and Hideki. Their numbers are up, too, and a lot of busy plants like Arrow are going to be on hand to yell "Bingo." That will be a great day for the decent members of the human race.

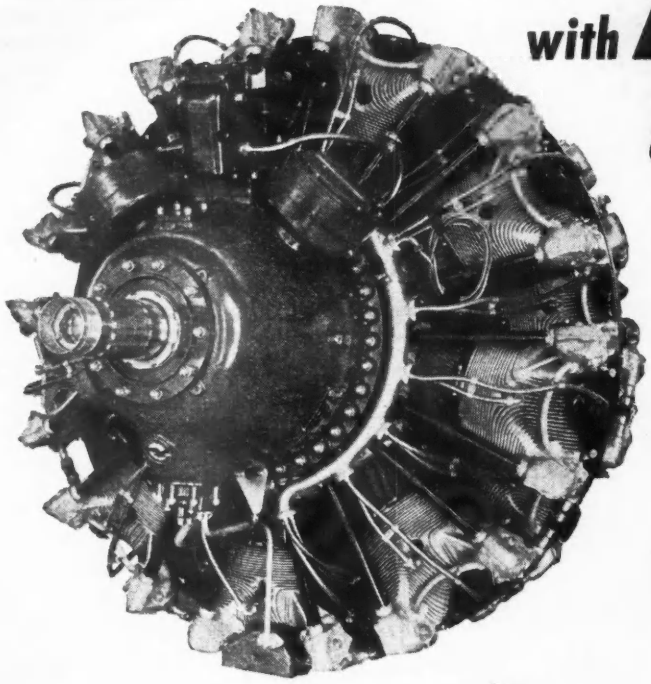
ARROW SAFETY DEVICE CO.
MT. HOLLY, N. J.

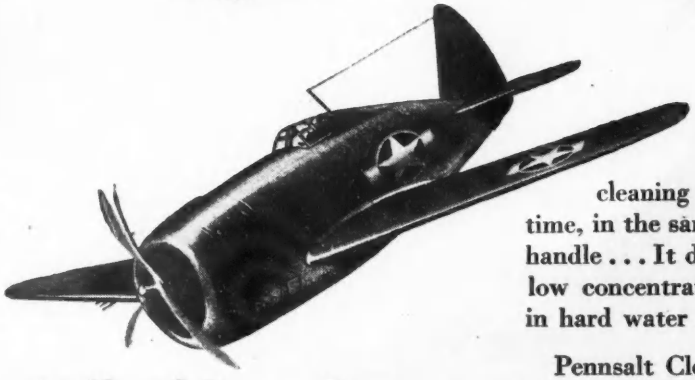
PRATT & WHITNEY AIRCRAFT

cleans engine parts

with PENNSALT CLEANER K-7

Reg. U. S. Pat. Off.





in the Bullard-Dunn Process

An important metal cleaning job in this plant is the removal of scale and oil from Pratt & Whitney aircraft engine parts. Pennsalt Cleaner K-7 was demonstrated in the Bullard-Dunn Process with highly satisfactory results, at a concentration of only 10 ounces per gallon.

Here are the outstanding advantages of this Pennsalt Cleaner: It does *not* leave a film . . . Both cleaning and defilming are done in minimum time, in the same tank . . . Pennsalt K-7 is easy to handle . . . It does not fume . . . It can be used at low concentrations . . . And it is suitable for use in hard water areas.

Pennsalt Cleaner K-7 was designed specifically for the cleaning and defilming operations in the Bullard-Dunn Process and has been thoroughly tested and approved by The Bullard Company.

Pennsalt Cleaner K-7 is one of a complete line of Pennsalt Cleaners available for all types of metal cleaning. If you have a wartime metal cleaning job, by all means make use of the wide experience of our technicians. No obligation. Simply write fully about your problem to our Pennsalt Cleaner Division, Dept. AA.

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

New York • Chicago • St. Louis • Pittsburgh • Minneapolis • Wyandotte • Tacoma

N.E. Steels Replacing Alloy Steels for Many Purposes

Improved Heat-Treating Methods and Availability Of Electric Furnace Steel Ease Pressure on Alloys

By W. C. Hirsch

What during the earlier stages of the war came to be called the Battle of Alloy Steel, is progressively abating in seriousness. Not that nickel and chromium are in more abundant supply than they have been ever since the outbreak of hostilities, but metallurgists and steel engineers are doing considerable less worrying on that score than formerly. N.E. steels are better understood by users and have become commonplace for many purposes, in which formerly none but pre-war standard grades were thought serviceable. Advances in heat-treating procedure and the broader availability and use of steels made in the electric furnace contributed to the easing of pressure on the supply of the traditional alloying materials. R. B. Schenck, chief metallurgist of the Buick Motor Division recently stated that ferro-alloys containing boron, known as "special addition agents" can endow a carbon steel with the mechanical properties of a low alloy steel and a low alloy steel with properties equivalent to a high alloy steel. A notable example, said Mr. Schenck, was a long torsion bar, 2 inches in diameter, which had given satisfactory service in arduous war uses. Boron steel, which is now attracting much attention, is by no means a new development, but until the present war emergency it was looked upon as an alloy of minor importance. Investigators before World War I pointed out that boron increased tensile strength without actually hardening the steel.

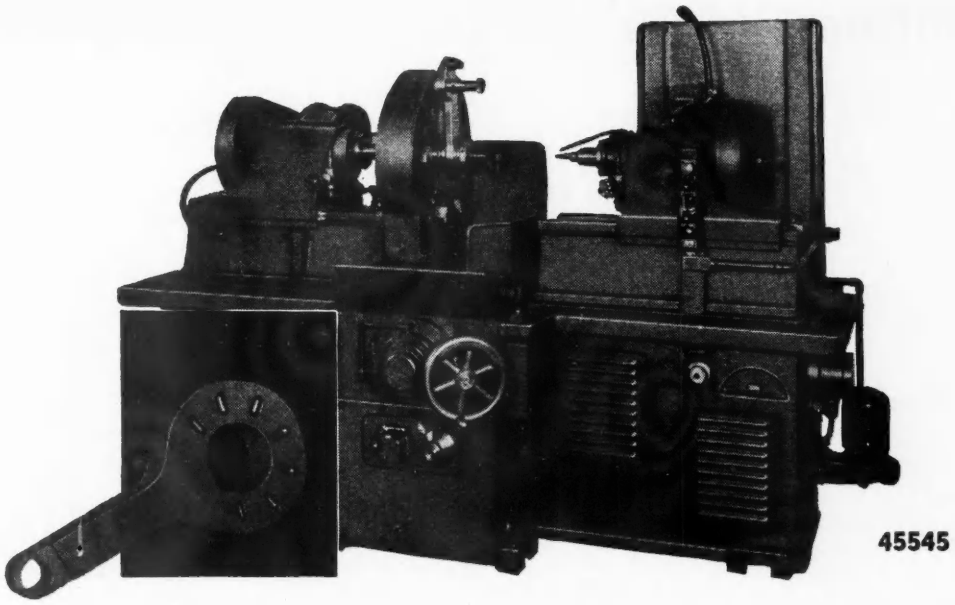
It is significant that rather neglected metallurgical combinations are being modernized and made more efficient by way of a contribution to the war effort. According to John T. Whiting, director of the Steel Division of the War Production Board, the new electric furnace program is now 85 per cent completed. Emphasis during the year's remainder is to be laid on the Army's need of plain carbon steel instead of alloy and special steels. Bearing in mind that the base price of alloy steel made in the electric furnace is $10 a ton higher than that of the open hearth product, WPB is making special efforts to promote at this time the use of as much of the electric furnace product as possible, in order that increased capacity may be put to full use with as little delay as possible, this in spite of WPB having prodded open-hearth producers not so long ago to show more interest in the production of alloy steels. With Great Lakes freighters now hauling smaller cargoes, so as to comply with U. S. Maritime Commission regulations, a further dent in iron ore receipts is indicated, making the need of a corresponding increase in the supply of scrap imperative.

While the Office of Economic Warfare is seeking to adjust the price to be paid Bolivian tin producers midway between what the Bolivians want and the existing 60-cent contract, concern is being expressed over post-war tin arrangements. The Japanese are reported to be contemplating transfer of tin properties to the ownership of Malay and Dutch East Indies natives, thus complicating the situation.

SEND FOR FREE SAMPLE
This ONE LENGTH CLAMP WILL MAKE ALL THESE CLAMP SIZES
. . . AND HUNDREDS OF OTHER SIZES
Central UNIVERSAL CLAMPS
Are Used in Production and Service of
Army and Navy Trucks, Tanks, Jeeps, Aircraft, Half-Tracks, Amphibians, Cranes, Marine Engines, Road Rollers, Farm Machinery, Portable Saws, Searchlights, All Types of Radiator Hose, Diesel and Gasoline Motors.
This powerful, self-locking clamp is absolutely perfect for all hose connections. Easiest to use! Has maximum take-up. Comes packed flat in any length to fit any desired range of diameter sizes.
CENTRAL EQUIPMENT CO.
1018 So. Wabash Avenue Chicago 5, Ill.

Kaiser Is Head of Brewster

Henry J. Kaiser has been elected president of the Brewster Aeronautical Corporation, to succeed Frederick Riebel, Jr., who has resigned as president and director to accept an assignment for the Navy.



New Double-End Hydraulic Spline Milling Machine by Snyder

This machine is designed to mill seven slots in each side of an aircraft master rod, illustrated in the tryout piece, inset. The part is loaded and clamped manually on a seven-position indexing fixture which is mounted on a reciprocating table moving between solid stops.

The two milling heads advance rapidly against hydraulically operated feed stop screws and feed into the work by steps which are adjustable from .005″ to .060″ per infeed stroke. Meantime, the hydraulically operated table maintains its automatically reciprocating transverse travel cycle, thus establishing the length of the slots. This transverse movement is adjustable for feed travel of one-half inch to ten inches per minute.

When full cutting depth is reached, cutters dwell in the work during several reciprocations to produce a clean finish in the slots. Each slot measures 1⅛″ x 7/16″ x 7/16″. Production rate is approximately three rods an hour.

For set-up and tryout purposes, infeed can be controlled manually. Both manual and automatic infeed are indicated, per stroke, on the dial on the front of the machine beside the handwheel. The machine base is welded steel construction and houses the bulk of the reciprocating and feed mechanism. Hydraulic equipment and coolant container are housed separately on the rear of the machine.

Although developed especially for the aircraft industry, this machine embodies well-established operating principles and includes standard Snyder units of well-proved efficiency, all of which lend themselves readily to application in post-war production.

★

POST-WAR PLANNING

The advantages of using special machines to achieve high production at low unit cost will be just as important in post-war operations as they are today. The time to consider such machines is *now*, while product designs are still flexible and may be adapted, if necessary, to secure the greatest possible advantages in machine design. In this important phase of post-war planning, the experience and advice of Snyder engineers may prove most valuable to you. It is freely at your service, without obligation. We invite your inquiries.

SNYDER TOOL & ENGINEERING COMPANY

3400 East Lafayette — Detroit 7, Michigan

SNYDER

DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION *AT LOW UNIT COST*

Military Demand for Heavy Trucks Still Increasing

Many Vehicles Have Been Shipped Abroad Under Lend-Lease to Other United Nations

U. S. manufacturers of commercial vehicles have helped put the armies of the United Nations on wheels in the mobile war they are waging with the Axis in many parts of the world. Since the national defense program was inaugurated in May, 1940, the U. S. has produced 1,233,000 trucks and military vehicles. And since Jan. 1, 1942, this country has made 1,100,000 trucks and trailers. Many trucks have been shipped abroad to other of the United Nations under lend-lease, Russia alone receiving 80,000 trucks and 16,000 jeeps up to June 30, 1943. Great Britain also has received many lend-lease trucks, the British Eighth Army using a number in its pursuit of Marshal Rommel across North Africa. That military vehicle needs are not declining was indicated recently by R. L. Vaniman, director of the Automotive Branch of WPB, when he told industry representatives that military demand for heavy trucks is increasing and has been reflected in growing requirements for axles, engines, bearings and carburetors.

Dodge Truck Division of Chrysler Corp. is one of the largest suppliers of trucks to the Army, having delivered more than 275,000 to date. Other large producers are Chevrolet, GMC Truck and Coach Division of General Motors, Ford, Studebaker, International Harvester and White. Major suppliers in the heavy-duty category are Mack, which has delivered Army trucks with a gross vehicle weight of 219,000 tons, Diamond T, Autocar, Federal, Reo and GMC.

Due to the increasing military demand for four and six-wheel drive vehicles, the axle capacity of the truck industry has had to be expanded, especially with some heavy-duty civilian truck production authorized by WPB for 1944. To that end Timken-Detroit Axle Co. has arranged with Standard Steel Spring Co. to undertake a large subcontract for military truck axles. The order will require $20,000,000 of machine tools. Standard Steel Spring has acquired from DPC the $28,000,000 plant at Madison, Ill., in which General Steel Castings Corp. has been processing tank armor plate. Cutbacks in the tank program have made this plant unnecessary. Standard Steel Spring hopes to get this plant tooled for axle production within the next six months. Many forgings and castings will be purchased from other companies.

Standard Steel Spring has been the key company in a group of 16 automotive spring and bumper manufacturers who pooled their heat treating and machining facilities to process armor plate for tanks built by Cadillac and Fisher Body. Cutbacks in the tank program have somewhat reduced the volume of this work.

Dodge has been one of the pioneers in Army truck development. First Chrysler-built Dodge Army trucks were delivered in 1933 and by 1936 the volume had reached 3,539 vehicles. Seven thousand more trucks were delivered in the next three years but when the war broke out in Europe, orders were multiplied ten-fold. Prior to Pearl Harbor, most Dodge Army truck production was in the 1½-ton capacity. However, developmental work had begun on a lighter all-purpose vehicle and the Dodge ½-ton 4x4 was the result. Seven thousand of this type were used in 1940 Army maneuvers.

In 1941 Chrysler engineers worked

(*Turn to page 74, Please*)

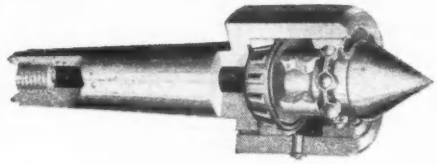
New!

IDEAL A-C MAGNETIC CHUCK and Demagnetizer

MAGNETIC CHUCK AC RECTIFIER DEMAGNETIZER ALL IN ONE!

A complete, self-contained unit. No supplementary equipment necessary. Operates from any ordinary "AC" outlet. Speeds up War Work on surface grinders, planes, millers, etc. Just place job on chuck face, turn switch . . . that's all! No clamps, vises, needed. Holds work rigidly. Demagnetizes work after it's finished.

IDEAL LIVE CENTERS

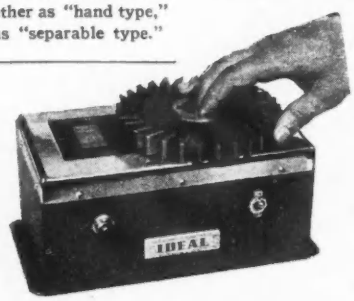


Enable machines to take heavier loads, take deeper cuts and at higher speeds, because IDEAL LIVE CENTERS rotate with the work. Three interchangeable inserts for all centered and uncentered work.

IDEAL ELECTRIC TACHOMETER

For more efficient production, check R.P.M. constantly. Accurate to plus or minus 1 per cent of full scale deflection. Generator separable from meter. Can be used together as "hand type," or as "separable type."

IDEAL DEMAGNETIZER



Quickly demagnetizes tools, parts, drills, etc. Removes metallic dust, flakes and fine chips, etc., clinging to cutting edge, by a single pass across the demagnetizer. Keeps tools sharper longer. Powerful—portable.

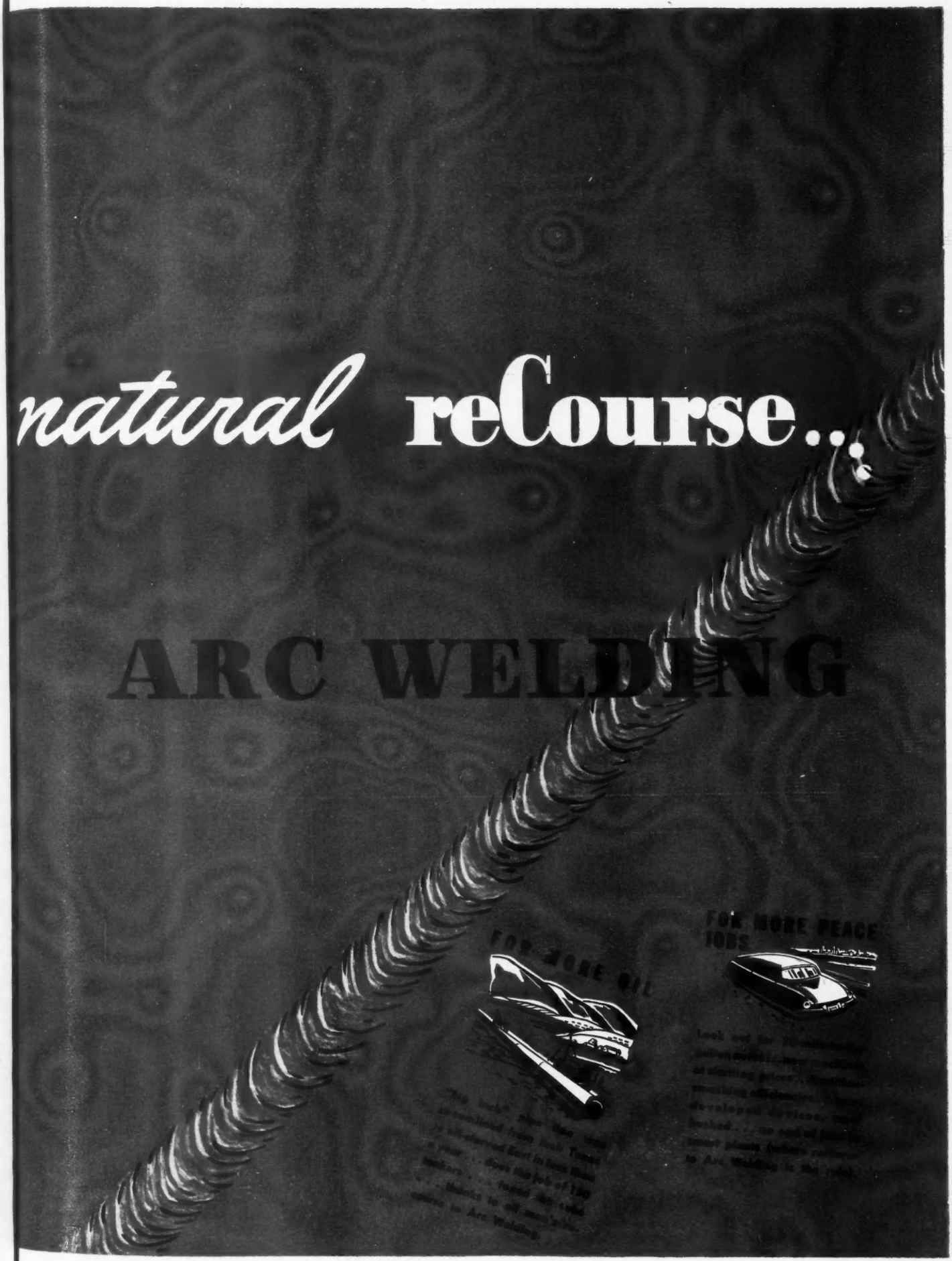
FREE . . . Machine Tool Accessories catalogue, gives information on these and many other time-saving tools!

IDEAL Sycamore

★ IDEAL COMMUTATOR DRESSER CO ★

3000 Park Avenue • Sycamore, Illinois

SALES OFFICES IN ALL PRINCIPAL CITIES



Recourse: According to Webster, *"a going to for aid or protection"*

New Products

Sealing Tapes

The Pittsburgh Plate Glass Company, Pittsburgh, Pa., has developed several sealing tapes called Fabseal, Chromseal, and Stratoseal which are made in rolls 50 ft long and in widths varying from ½ in. to 24 in.

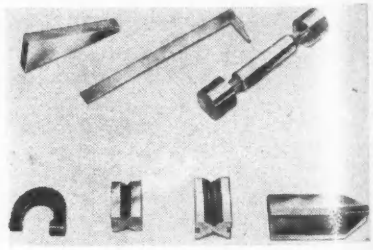
Fabseal is particularly designed for use as a gasket in the construction of flying boat hulls, gas and oil tanks where internal or external pressures are encountered under constant vibration or sudden impact. It is an impregnated fabric with an interleaf separating the fabric layers. Before the fabric is impregnated with compound, it is treated to make it water-, gasoline-, and oil-resistant to prevent wicking action. The tape may be applied to any metal or wood section of a fuel tank, pontoon, etc., and after application the interleaf is removed, exposing the upper surface of the tape, which is then ready to receive another riveted or bolted section.

Chromseal is a solid ribbon of compound with no fabric as part of its composition, and therefore is more flexible than Fabseal. It is especially suited as a gasket material between riveted or bolted surfaces of fuel tanks, as well as a seal for plastic enclosures and glass cockpit framing.

Stratoseal, as its name suggests, is designed for the sealing of the cabins of stratosphere-flying planes. Stratoseal, also a solid ribbon of compound, meets extreme conditions and remains flexible. It can be applied between faying surfaces, overlapping metal joints, or over the inside surface of the joints by the use of Stratoseal Adhesive.

Dry Chemical for Fire Extinguishers

The DuGas Engineering Corporation, Marinette, Wis., offers an improved dry chemical for use in their dry chemical fire extinguishers. This new dry chemical, known as "Plus-Fifty DuGas Dry Chemical," does not require a priority



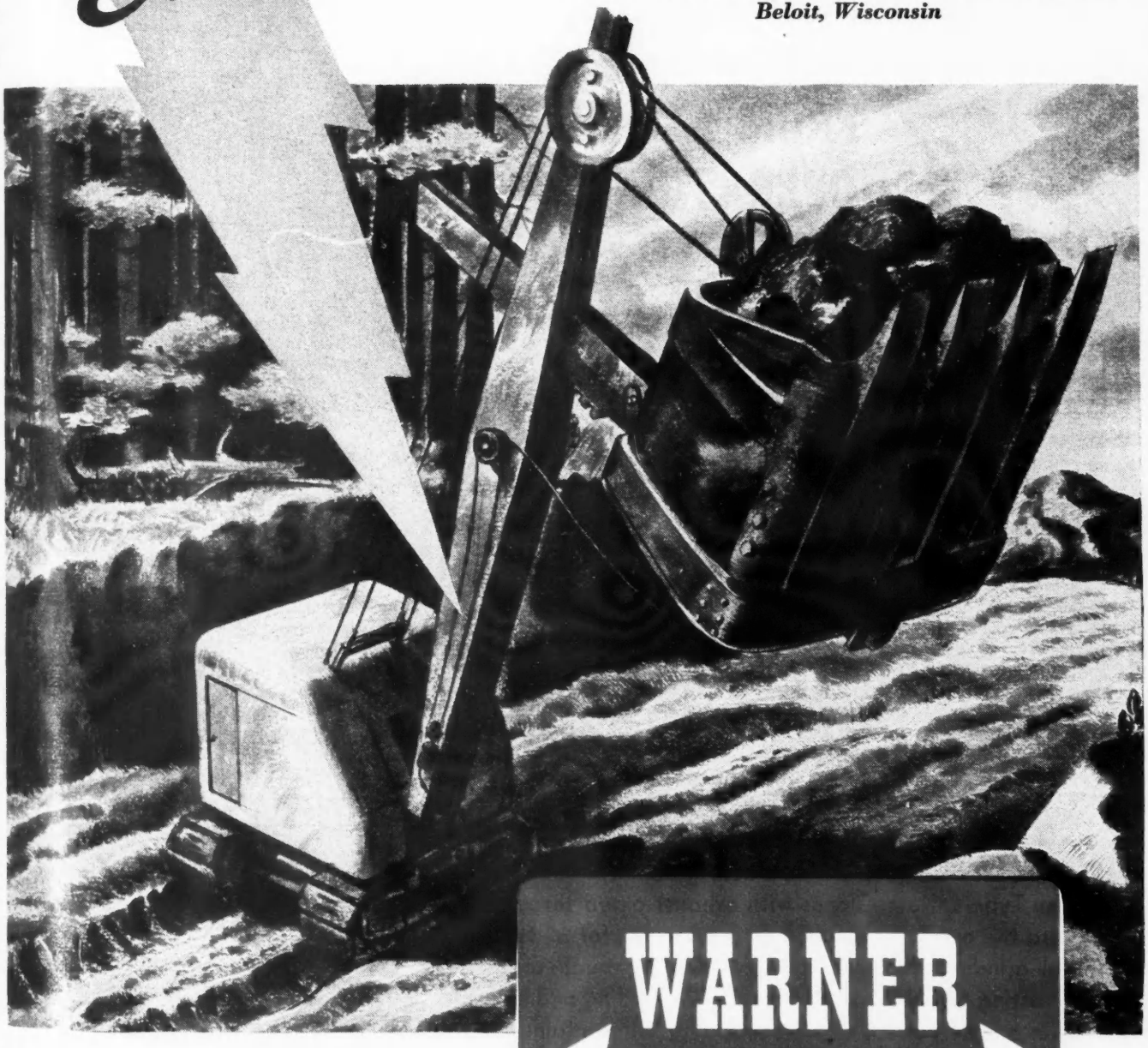
One of the latest developments in powder metallurgy to come out of the Amplex Div., Chrysler Corp., is the manufacture of small tool elements such as micrometer frames, vee-blocks, sine bars, caliper parts, plug gages, etc. Perhaps the most interesting aspect of this development is the use of non-critical waste material—steel mill waste—which was converted to the powder used for these parts.
The techniques developed by Amplex produce parts of extreme accuracy and of such hardness as to cut glass.

THEN POWER SHOVELS WILL BE

Braked Electrically

When World War II struck the world with all its fury, Warner Electric Brakes were ready! Immediately, their accurate control and split-second stopping power, as proved in years of service on leading tractor-trailer fleets, were enlisted by our armed forces. Dependable in all kinds of weather, Warner Electric Brakes were adopted for essential motor transports and huge artillery pieces, demonstrating their superiority today on all of the world's battlefields. And when Victory is won, the experience gained under most grueling war conditions will be applied to electric brakes for scores of new peacetime uses. Then power shovels—and many other types of power equipment will be *braked electrically*.

WARNER ELECTRIC BRAKE MFG. COMPANY
Beloit, Wisconsin

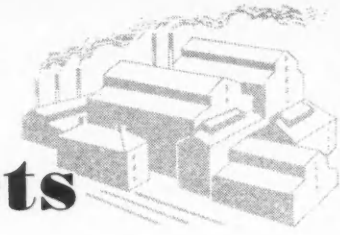


WARNER
ELECTRIC BRAKES

BUY WAR BONDS

CONTROLLED SPLIT-SECOND STOPPING POWER FOR ANY PURPOSE

New Products



Sealing Tapes

The Pittsburgh Plate Glass Company, Pittsburgh, Pa., has developed several sealing tapes called Fabseal, Chromseal, and Stratoseal which are made in rolls 50 ft long and in widths varying from ½ in. to 24 in.

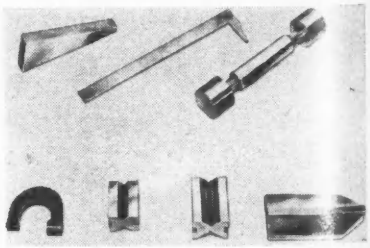
Fabseal is particularly designed for use as a gasket in the construction of flying boat hulls, gas and oil tanks where internal or external pressures are encountered under constant vibration or sudden impact. It is an impregnated fabric with an interleaf separating the fabric layers. Before the fabric is impregnated with compound, it is treated to make it water-, gasoline-, and oil-resistant to prevent wicking action. The tape may be applied to any metal or wood section of a fuel tank, pontoon, etc., and after application the interleaf is removed, exposing the upper surface of the tape, which is then ready to receive another riveted or bolted section.

Chromseal is a solid ribbon of compound with no fabric as part of its composition, and therefore is more flexible than Fabseal. It is especially suited as a gasket material between riveted or bolted surfaces of fuel tanks, as well as a seal for plastic enclosures and glass cockpit framing.

Stratoseal, as its name suggests, is designed for the sealing of the cabins of stratosphere-flying planes. Stratoseal, also a solid ribbon of compound, meets extreme conditions and remains flexible. It can be applied between faying surfaces, overlapping metal joints, or over the inside surface of the joints by the use of Stratoseal Adhesive.

Dry Chemical for Fire Extinguishers

The DuGas Engineering Corporation, Marinette, Wis., offers an improved dry chemical for use in their dry chemical fire extinguishers. This new dry chemical, known as "Plus-Fifty DuGas Dry Chemical," does not require a priority



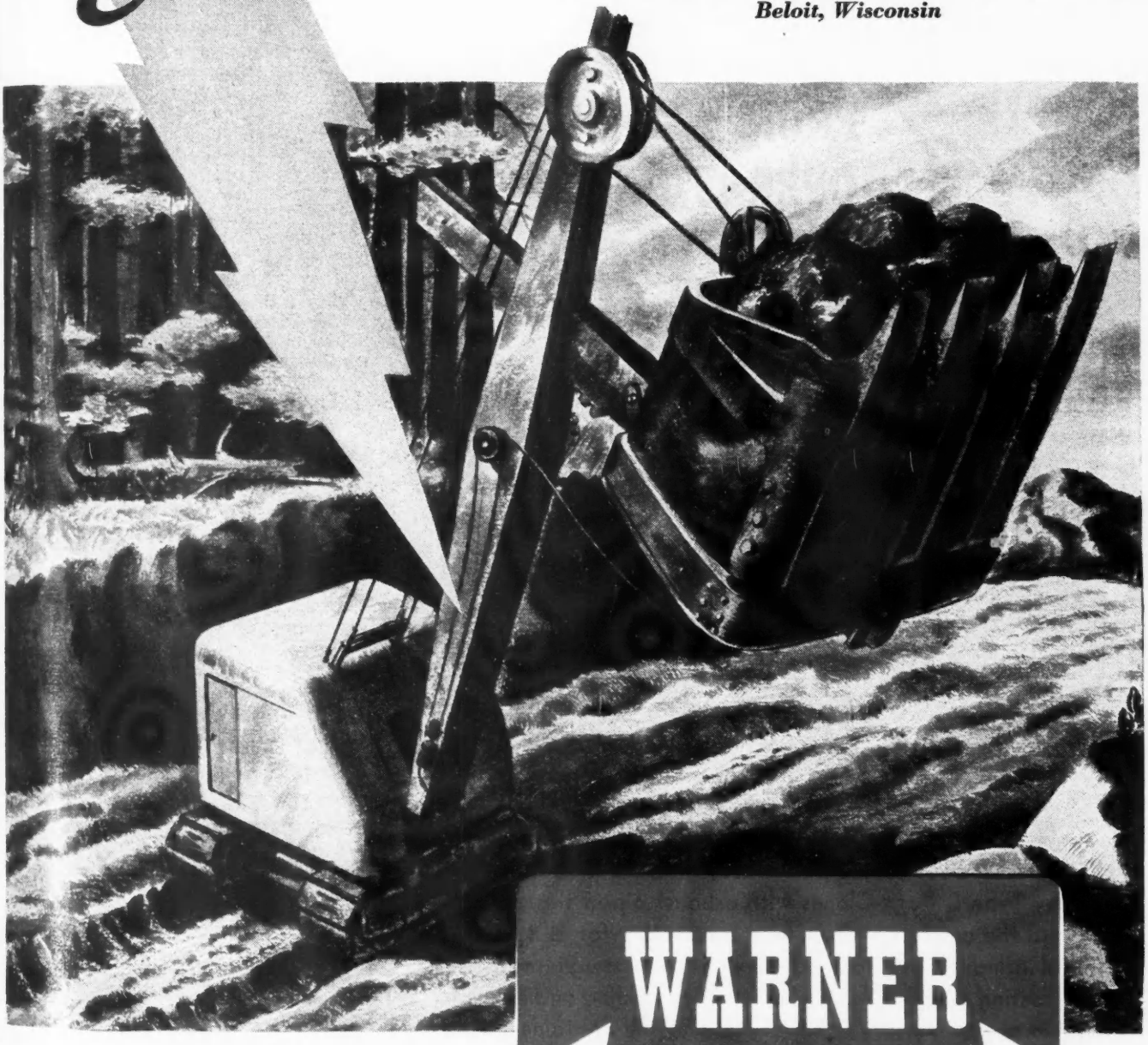
One of the latest developments in powder metallurgy to come out of the Amplex Div., Chrysler Corp., is the manufacture of small tool elements such as micrometer frames, vee-blocks, sine bars, caliper parts, plug gages, etc. Perhaps the most interesting aspect of this development is the use of non-critical waste material—steel mill waste—which was converted to the powder used for these parts.
The techniques developed by Amplex produce parts of extreme accuracy and of such hardness as to cut glass.

THEN POWER SHOVELS WILL BE

Braked Electrically

When World War II struck the world with all its fury, Warner Electric Brakes were ready! Immediately, their accurate control and split-second stopping power, as proved in years of service on leading tractor-trailer fleets, were enlisted by our armed forces. Dependable in all kinds of weather, Warner Electric Brakes were adopted for essential motor transports and huge artillery pieces, demonstrating their superiority today on all of the world's battlefields. And when Victory is won, the experience gained under most grueling war conditions will be applied to electric brakes for scores of new peacetime uses. Then power shovels—and many other types of power equipment will be *braked electrically.*

WARNER ELECTRIC BRAKE MFG. COMPANY
Beloit, Wisconsin



WARNER
ELECTRIC BRAKES

BUY WAR BONDS

CONTROLLED SPLIT-SECOND STOPPING POWER FOR ANY PURPOSE

because critical materials are not used for its manufacture.

The results of tests indicate that, when the new dry chemical is applied from DuGas gas-pressure type dry chemical extinguishers, it has considerably greater fire extinguishing effectiveness than the dry chemical formerly used.

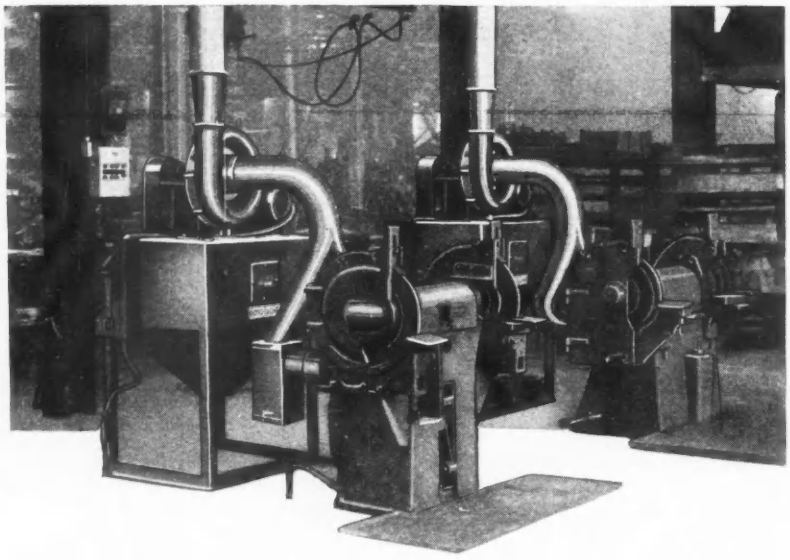
Solution for Grinding, Honing and Lapping

Quaker Chemical Products Corp., Conshohocken, Pa., is now delivering a new product called Quaker Microgrind No. 132. It is a dark, heavy-bodied liquid that, when mixed with water in proportions ranging from one part to three up to one part in seventy-five, makes a translucent, permanent solution. It is stable in hard or soft water, and can be used on all grinding, honing, lapping or superfinishing operations. The maker claims that it completely eliminates glazing and loading of abrasives, prevents recirculation of chips, is non-injurious to skin or metals, and is odorless and non-foaming.

Rock Wool Sound Proofing Material

Installation of air conditioning systems often is followed by an annoying increase in the transmission of noises. Ducts of an air conditioning system frequently act like speaking tubes, carrying sounds from one room to another. To meet this disturbance, The Celotex Corporation, Chicago, Ill., is offering Q-T Ductliner, a sound proofing and thermal insulation material composed of rock wool formed into pads with a special binder, for use in sheet metal and other ducts. Q-T Ductliner is both moisture and fire-resistant.

Dust FROM ALL GRINDING OPERATIONS EFFECTIVELY HANDLED BY ROTO-CLONE



PICTURED above are two wheel grinding stands served by Type D Roto-Clones with exhaust piped through the roof to the outside. Roto-Clone is effective for all types of metal grinding dust control service from rough snagging and casting cleaning to the finest finish grinding and is available in a wide variety of sizes including self-contained units designed to exhaust single grinding or polishing operations.

Complete information on the design and installation of a Roto-Clone dust control system to meet your requirements will be submitted to you without obligation. Write for Bulletin No. 272.

AMERICAN AIR FILTERS

AMERICAN AIR FILTER COMPANY, INC., 449 CENTRAL AVE, LOUISVILLE, KY.

IN CANADA: DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

Steel Cartridge Cases in Production

(*Continued from page* 25)

a soluable oil dip for protection against atmospheric corrosion.

Routine inspection involves a 100 per cent check on every dimension of each case, including a preliminary visual inspection to detect obvious surface defects. To speed up these operations, the inspection benches are served by continuous fabric belt conveyors for transporting the cases from one station to the next. Motion study has been ingeniously applied to break down the stages of inspection into related groups of operations, so that an operator may take only one operation or as many as four to six, depending upon the nature of the job at a particular station. Where a multiplicity of checking is required, the operator has been provided with a suitable fixture and gaging equipment permitting the use of both hands simultaneously.

A group of the Sheffield Multi-check master gages, familiar in production inspection of shells, is provided for the use of Army inspectors as a spot-checking and sampling inspection device.

From a management standpoint Auto-Lite's Corcoran-Brown operation is distinguished for its compactness of plant and departmental layout, for the establishment of straight-line methods which connote economy of routing and movement of materials, and for the selection of production equipment of the latest and finest types, so admirably suited to low-cost, high production manufacture.

DB-601 Features

(*Continued from page* 31)

return valve, and a lagged fuel passage to discourage gassing of the fuel where the holder passes through the cylinder block.

Two arrangements of discharge orifices have been observed and these are shown in Fig. 5. The early type with six holes was so located that four holes in line were in a plane parallel to the crankshaft axis, the other two in a perpendicular plane through the cylinder axis, with the hole farther from the center leading toward the combustion space. The later type nozzle was located with the four holes symmetrical with the plane through the cylinder axis; the two middle holes discharged towards the combustion space. Early clamp nuts were finned, but later examples have no fins.

Nimble-Fingered COLOSSUS

Forging rail joints or rail tie bars is the job this 2500-ton capacity Clearing Hydraulic Press does with exceptional speed and efficiency. It handles and forges automatically any of the great variety of rail joints used by the railroads, no matter what the length or profile may be.

Heated rolled bars are fed on a conveyor from furnace to press. During each upstroke, the press feed picks up a new bar as well as the joint which has just been forged. Then during the downstroke, the new bar is placed on the die ready for forging at the finish of the stroke and the forged joint previously picked up is discharged directly into the quenching tank. This completely automatic production cycle turns out tie bars at the rate of 600 per hour.

The engineering skill and production facilities which created this nimble-fingered colossus can serve you equally well. The Clearing organization is able and willing to be of assistance on your press problems, especially those of the "can't-be-done" variety. Get the benefit of this help—consult Clearing. CLEARING MACHINE CORPORATION, 6499 West 65th Street, Chicago 38, Illinois.

CLEARING

CLEARING PRESSES

MECHANICAL AND HYDRAULIC

SAE Nominees for 1944

The following nominations for offices of the Society of Automotive Engineers, Inc., have been made for 1944:

PRESIDENT, W. S. James, chief engineer, Studebaker Corp.

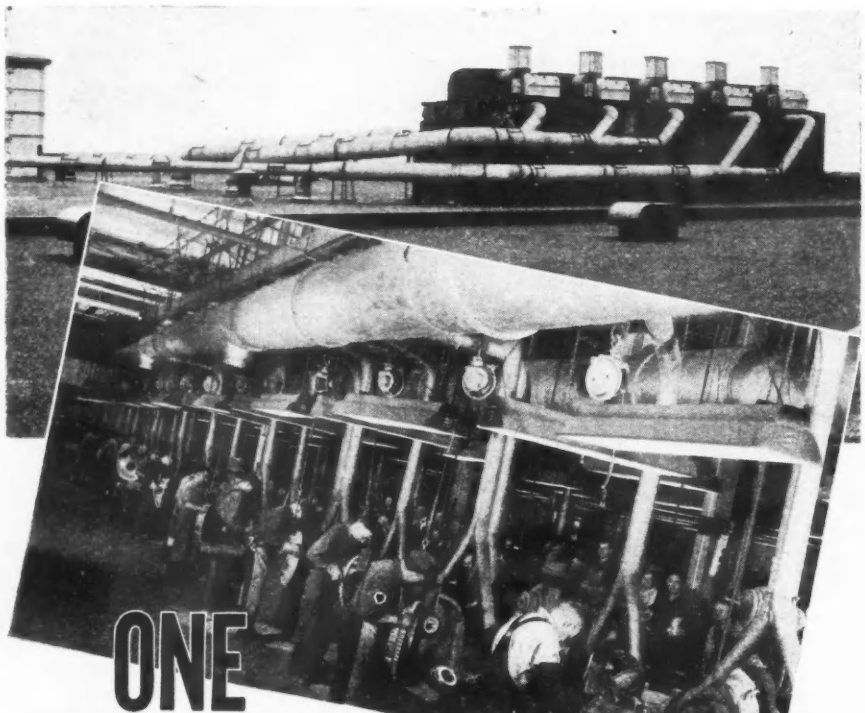
TREASURER, David Beecroft, Bendix Products Division, Bendix Aviation Corp.

VICE-PRESIDENTS: Aircraft, R. D. Kelly, superintendent, Development, United Air Lines Transport Corp.; Aircraft-Engine, A. T. Gregory, chief engineer, Ranger Aircraft Engines; Diesel-Engine, A. J. Blackwood, fuel research engineer, Standard Oil Development Co.; Fuels & Lubricants, J. R. Sabina, manager, Petroleum Chemicals Testing Laboratory, E. I. du Pont de Nemours & Co.; Passenger-Car, E. H. Smith, executive engineer, Aircraft Engine Division, Packard Motor Car Co.; Passenger-Car-Body, E. C. DeSmet, chief engineer, Aircraft Division, Willys-Overland Motors, Inc.; Production, J. E. Hacker, production manager, Cleveland Diesel Engine Division, General Motors Corp.; Tractor & Farm Machinery, O. R. Schoenrock, chief engineer, J. I. Case Co.; Transportation & Maintenance, E. W. Templin, automotive engineer, Los Angeles Bureau of Power & Light; Truck & Bus, E. M. Schultheis, Detroit representative, Clark Equipment Co.

MEMBERSHIP ON SAE COUNCIL: Term of 1944-1945: L. R. Buckendale, vice-president, charge engineering, Timken-Detroit Axle Co.; R. F. Steeneck, district manager, Fafnir Bearing Co.; H. T. Youngren, chief engineer, Oldsmobile Division, General Motors Corp.

To serve for one year, to fill the unexpired 1943-1944 term of J. C. Zeder, resigned: Arthur Nutt, vice-president of engineering, Wright Aeronautical Corp.

Continuing on the Council for 1944 will be the following men who were elected for a two-year term at the beginning of 1943: N. P. Petersen, president, Canadian Acme Screw & Gear, Ltd., and C. G. A. Rosen, director of research, Caterpillar Tractor Co. Serving on the 1944 Council as past-presidents will be Mac Short, vice-president, engineering, Vega Aircraft Corp., and A. W. Herrington, chairman, board of directors, Marmon-Herrington Co., Inc.



ONE
HYDRO-WHIRL
COLLECTS DUST
FROM
EIGHTY
SEPARATE
MACHINES

BUY WAR BONDS

Hydro-Whirl Dust Collectors are engineered to meet any requirements—from 700 to 100,000 C.F.M.—designed for all forms of metal dust (magnesium, aluminum, iron) created from grinding, buffing, polishing, or sanding. The dust is "water-whirled" out of the air and is knocked down into a tank below, from which it is removed periodically as sludge by conveyor.

HYDRO-WHIRL
INDUSTRIAL SHEET METAL WORKS
NEW NAME → PETERS-DALTON, INC.
634 EAST FOREST AVE., DETROIT 1, MICH.
MFRS. HYDRO-WHIRL DUST COLLECTORS AND SPRAY BOOTHS — INDUSTRIAL OVENS, MECHANICAL WASHERS AND VENTILATION SYSTEMS

ARMY E NAVY

Awards

Names and winners of Army-Navy "E" awards in or allied with the automotive and aviation industries, announced since the Oct. 1 issue of *Automotive* and *Aviation Industries* went to press.

CORNING GLASS WORKS, Wellsboro Plant, Wellsboro, Pa.
E. I. du PONT de NEMOURS & CO., INC., Arlington Plant, Arlington, N. J.
HERCULES POWDER COMPANY, INC., Mansfield Plant, Mansfield, Mass.
KIEKHAFER CORPORATION, Cedarburg, Wis.
MURPHY DIESEL COMPANY, Milwaukee, Wis.
NATIONAL ENGINEERING COMPANY, Chicago, Ill.
RANSOME MACHINERY COMPANY, Ransome Plant, Dunellen, N. J.
THE WHITEHEAD & HOAG COMPANY, Newark, N. J.
THE YALE & TOWNE MANUFACTURING COMPANY, Philadelphia Div. Philadelphia, Pa.

A third Star has been added to the Army-Navy "E" Pennant of THE SYPHON COMPANY, Knoxville, Tenn., for sustained excellence in production.

Clearing Establishes Two New Offices

Sales and service offices have been opened up in New York and Cincinnati by the Clearing Machine Corporation, Chicago, manufacturer of Hydraulic and mechanical presses. Mr. J. R. Sheppard is in charge of the New York office at 30 Rockefeller Center. Mr. W. F. Dew is in charge of the Cincinnati office at 2107 Carew Tower.

Obituary

George T. Howard, 39, Sales Engineer handling small tools and gages at the Pratt & Whitney Chicago office, died September 24. He had been associated with Pratt & Whitney since September 1, 1933 and had been a Sales Engineer since February, 1935.

Herbert W. Knapp, Secretary and Director of Sales of the McQuay-Norris Mfg. Company, died suddenly of a heart attack September 25. Mr. Knapp joined the McQuay-Norris organization in 1915 in a minor sales capacity, working the New Mexico and southern Colorado territories. He was later made a Branch Manager at Denver and moved from there to Kansas City. His next position with the company was that of District Sales Manager with headquarters in Omaha. Later, he assumed the District Managership of two districts and in 1928 he was made General Sales Representative for the entire organization. With the death of C. L. Derrickson, he became a director and officer of the company and his title was changed to Director of Sales.

William S. Harley, 62, chief engineer and treasurer of the Harley-Davidson Motorcycle, died suddenly Sept. 19 at Milwaukee. He was one of the founders of the company in 1908. He was a member of the SAE.

Carl E. Johansson, 79, inventor of the micro-gage and Johansson gage blocks, died Sept 30, at his home in Elkistuna, Sweden. Johansson began his precision gage development work at the Swedish government arsenal at Elkistuna and perfected his first set of metric gage blocks in 1896. During World War I he was employed by the Ford Motor Co., which purchased the North and South American manufacturing rights to his gage blocks in 1923. He made frequent trips to the U. S. from Sweden until 1932, during which time he served as a consultant to Ford. He was knighted by King Gustav in 1930.

Budd G. Nice, president and chief executive of the Nice Ball Bearing Company for thirty-five years. died Sept. 29 after a short illness.

MEN . . . . . .

Election of **Gwilym A. Price** as a vice president of Westinghouse Electric and Mfg. Co., has been announced. The appointment of **Thomas I. Phillips,** vice president, as head of the company's Pittsburgh Division, has also been announced by Westinghouse.

Tinkham Veale II has been appointed production manager of the Tocco Induction Process Division of The Ohio Crankshaft Co. He will be in charge of all phases of production of the Tocco Div. of the company.

J. Frederic Wiese was elected a vice president of Lukens Steel Co. He will be in charge of the combined sales of Lukens and its two subsidiaries, By-Products Steel Corp. and Lukenweld, Inc.

Titeflex Metal Hose Co. has announced the appointment of **Adrien T. Von Schmid** as special field representative to the aircraft industry.

H. Clay Doss has been made branch manager of Ford Motor Co. in charge of the southeastern district at Atlanta, Ga. He was formerly general sales manager.

Wally E. George, formerly management assistant at Campbell, Wyant & Cannon Foundry Co., has joined the staff of Booz, Allen & Hamilton, Chicago management engineering organization.

Owen L. Holland has been appointed district manager of the welding division of the Chicago branch of the Metal & Thermit Corp. He was formerly chief of the welding, electroplating and equipment branch of the WPB.

Appointment of **Fred L. Black,** special assistant to A. M. Wibel, vice president, has been announced by Nash-Kelvinator.

Arthur J. Dickinson, formerly group engineer in charge of hydraulics design and installation on the MARS for Glenn L. Martin Co., has been appointed hydraulics design supervisor of Simmonds Aerocessories, Inc.

Advance Pressure Castings, Inc., has announced the appointment of **George A. Meyer** as general sales manager.

Richard A. Von Hake, vice president in charge of manufacturing, Lockheed Aircraft Corp., has retired from the company.

Lockheed Aircraft Corp. has announced the appointment of **Harris & McIntosh** as special assistant to the president, in charge of management control, organization control and master scheduling. He was formerly in charge of production control at Vega Aircraft Corp. Announcement has also been made of the appoint-

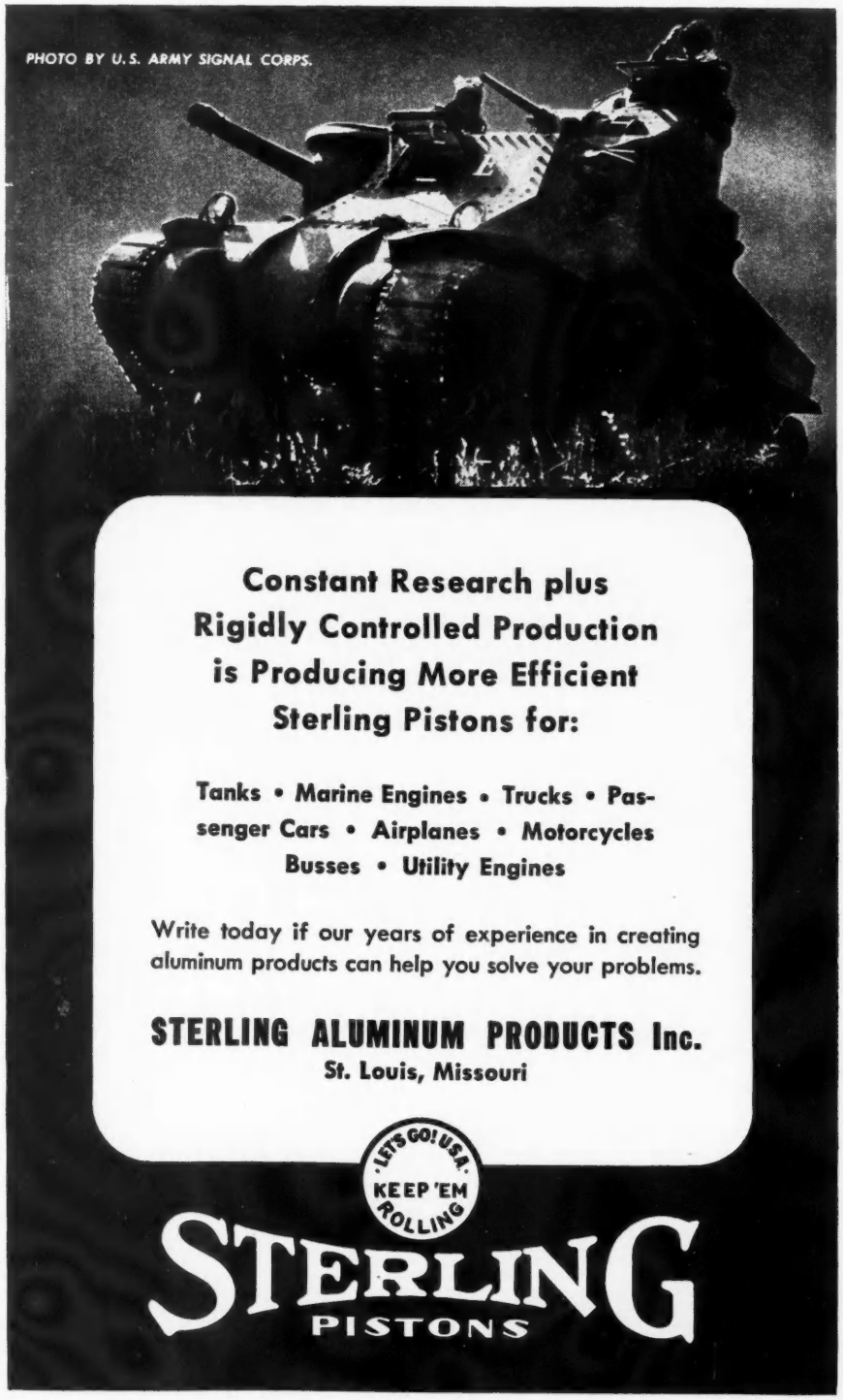
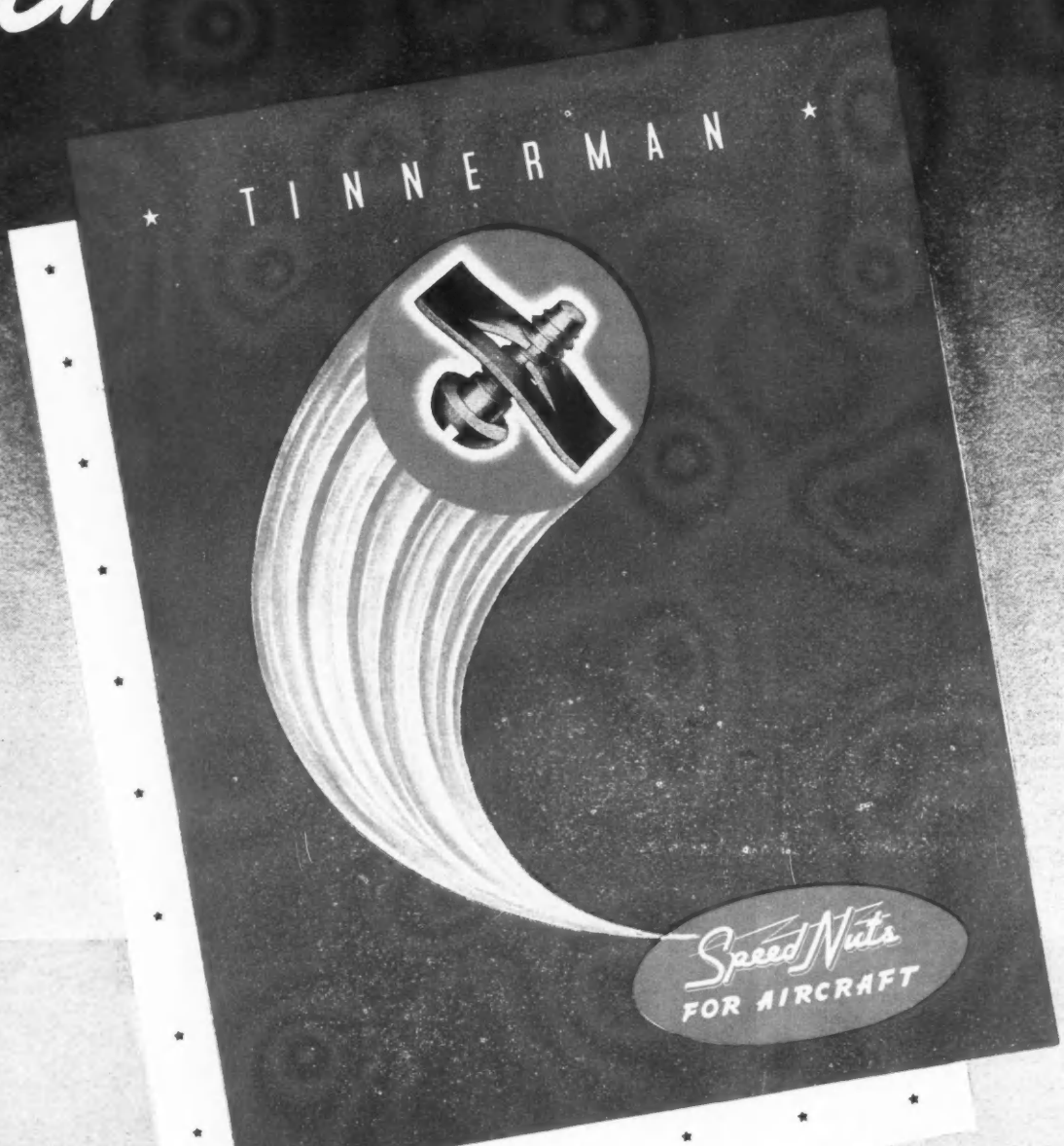


PHOTO BY U.S. ARMY SIGNAL CORPS.
Constant Research plus
Rigidly Controlled Production
is Producing More Efficient
Sterling Pistons for:
Tanks • Marine Engines • Trucks • Passenger Cars • Airplanes • Motorcycles
Busses • Utility Engines
Write today if our years of experience in creating aluminum products can help you solve your problems.
STERLING ALUMINUM PRODUCTS Inc.
St. Louis, Missouri
LET'S GO! U.S.A.
KEEP 'EM ROLLING
STERLING
PISTONS

New Book of Revelations



On *advanced* Fastening Technique

This booklet will make any assembly engineer happy. Its 24 pages are filled with over 50 new assembly devices and methods that save critical material, reduce weight, conquer vibration loosening, shorten assembly time and lower net costs. The new fastenings illustrated in this book are already speeding up assembly of planes and other war equipment. • This literature will not only help you right now, but will also serve as a handbook in planning assembly short cuts for your post-war products. SPEED NUTS specified for the assembly of these products of the future will pay big dividends.

Write for your copy TODAY.

TINNERMAN PRODUCTS INC. • 2059 Fulton Road, Cleveland, Ohio

IN CANADA: Wallace Barnes Co., Ltd., Hamilton, Ontario
IN ENGLAND: Simmonds Aerocessories, Ltd., London

Speed Nuts

FASTEST THING IN FASTENINGS!

ment of **Courtlandt S. Gross,** president of Vega Aircraft Corp., as vice president and general manager of Lockheed Aircraft Corp. Mr. Gross will continue as president of the Vega company.

M. J. Graham, who has been associated with International Harvester Co. for the past 37 years, has been appointed manager of manufacturing in direct charge of all American and Canadian production of the company.

The appointment of **R. S. Arnold** as assistant to **M. R. Minnich,** sales manager of the American Welding and Manufacturing Co., has been announced.

The election of **T. W. Pennington** as vice president in charge of sales has been announced by the Jessop Steel Co.

Thomas J. Anderson has been made director of purchases and **Frank W. Shymkus** purchasing agent of Acme Steel Co.

The Weatherhead Company has announced the appointment of **E. Van Vechten** to its Los Angeles branch office.

T. C. Dougan has been appointed assistant general purchasing agent for United Air Lines at the company's Chicago general headquarters. He succeeds **James Aldrich** now on leave of absence from United as an ensign in the Navy.

Members of the newly appointed Trailer and Truck Tank Manufacturers Advisory Committee of WPB are **G. A. Burns,** Burns Mfg. Co., Kansas City, Mo.; **T. A. Burress,** The Heil Co., Milwaukee; **Harvey C. Fruehauf,** Fruehauf Trailer Co., Detroit; **Christopher Hammond, Jr.,** The Steel Products Co., Inc., Savannah, Ga.; **C. E. Howard, Jr.,** Rehrig-Howard Co., Los Angeles; **John H. Jensen,** Quaker City Iron Works, Philadelphia; **William H. Klee,** The Pflaudler Co., Rochester, N. Y.; **E. H. Malden,** Davis Welding & Mfg. Co., Cincinnati; **E. M. Mellen,** Stainless & Steel Products Co., St. Paul; **L. A. Myers, Jr.,** Black Diamond Trailer Co., Bristol, Tenn. **John E. Graham** is presiding officer for the government.

L. D. Tompkins, of Wilton, Conn., has been appointed deputy director of the Office of Rubber Director and will continue in charge of the Operations Division. **Earl B. Babcock,** of Akron, has been named assistant rubber director in charge of product development and conversions; **Frank Creedon,** of Brockton, Mass., has been made assistant rubber director in charge of construction, and **Dr. Edward A. Gilliland,** of Cambridge, Mass., has been appointed assistant rubber director in charge of research and development.

E. Spencer Rider, eastern regional manager of Twin Coach Co., has been appointed special assistant to the director of the Division of Motor Transport of ODT. He will serve in a liaison capacity.

Van S. Wielosinski, formerly with the Carnegie-Illinois Steel Corp., Chicago, has been named plant metallurgist by Willys-Overland Motors, Inc.

Frank de Ganahl has resigned as vice president and general manager of Fleetwings Division of Kaiser Cargo, Inc. He had been president of the company from 1939 until it was acquired by the Kaiser interests in March, 1943. **S. D. Hackley,** a member of the West Coast Division of Kaiser Cargo, Inc., has been named chief operations manager of Fleetwings and **Russell E. Dill,** formerly of the East Coast Division, has been appointed chief administrative manager.

John J. Ryan, general counsel, has been elected a vice president of Republic Aviation Corp.

Henry Morton has been appointed vice president in charge of labor relations of Brewster Aeronautical Corp.

Frank A. Rudolph has been named eastern sales manager of Aircraft Accessories Corp., in charge of sales in the Dayton, Washington and New York offices.

Maurice V. Caldwell, formerly assistant to the president of Fuller-Johnson Corp., has been appointed vice president and general manager of Manson Mfg. Co., Detroit.

Justin A. Fitz has been named advertising director of Sperry Gyroscope Co., Inc.

Victory Scrap Bank Drive Has Commenced

The "Victory Scrap Bank" drive, which will extend from October 1 to November 15, has been officially announced by Donald M. Nelson, Chairman of the War Production Board, and endorsed by leading representatives of the steel industry and scrap dealers throughout the country. Although heavier grades of scrap from farm and industrial sources primarily are desired, all types and grades will be accepted.

The drive will be participated in by every community in the United States, working through the channels of their local Salvage Committees. School children throughout the nation will be marshalled together for the drive, through the direction of their local schools.

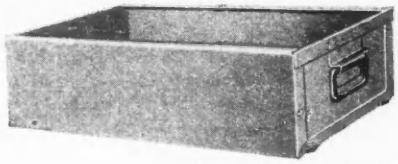
Winners of SAE Manly Memorial Medal Award

John Dolza and Harry C. Karcher, of Allison Division, General Motors Corp., Indianapolis, Ind., were awarded the 1942 Manly Memorial Medal of the Society of Automotive Engineers.

IMMEDIATE SHIPMENT

STEEL BOXES

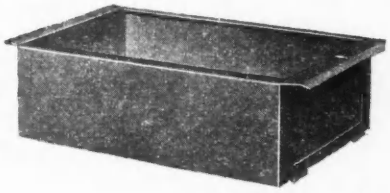
FOR YOUR PRODUCTION NEEDS



STYLE 300 STACKING BOX

Just right for your small parts. Light in weight, easy to handle. Equipped with drop handle each end. Runners save wear on bottom of box and act as positive stacking lock.

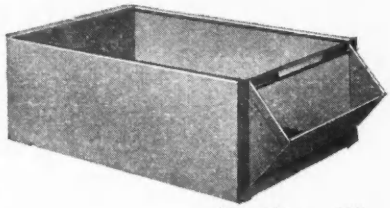
No. 301 6" x 9" x 3½"—20 ga. $ .55 Ea.
No. 302 8" x 12" x 4" —20 ga. $ .60 Ea.
No. 303 9" x 13½" x 4½"—19 ga. $ .75 Ea.



STYLE 600 STACKING BOX

An ideal all-purpose shop box. Sturdy all-welded construction. Heavy skids act as positive stacking lock and reinforce box at point of maximum wear.

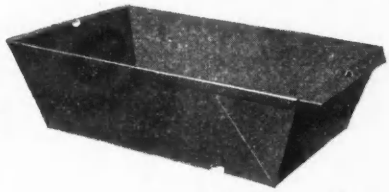
No. 601 10" x 16" x 6"—18 ga. $ .95 Ea.
No. 602 12" x 18" x 8"—16 ga. $1.25 Ea.



STYLE 500 STACKING BOX

Open front makes contents easily accessible when boxes are stacked. Will stack with Style 600 Boxes.

No. 501 10" x 16" x 6"—18 ga. $1.15 Ea.
No. 502 12" x 18" x 8"—16 ga. $1.50 Ea.



STYLE 100 TAPER PAN

One piece, all-welded construction. Hook handle at each end. Will nest perfectly when empty.

No. 101 10" x 18" x 6"—18 ga. $ .75 Ea.
No. 102 12" x 20" x 6"—16 ga. $ .90 Ea.

Prices F.O.B. Factory, Phila.—Any Quantity!

Order Today—Write, Wire or Phone

AMERICAN METAL WORKS, INC.

1537 Germantown Avenue, Phila. 22, Pa.

I.A.S. to Hold Meeting

Governmental and Civilian authorities will discuss present and future air transport problems at a national meeting at The Hotel Statler in Washington, D. C., on October 26, it was announced by the Institute of the Aeronautical Sciences of New York.

Some of the problems to be discussed are: Domestic Air Cargo, Airport Design, Intercontinent Flying, and Post War Planning. Speakers will include Colonel H. R. Harris, Commanding Officer of the Domestic Transportation Division of the Air Transport Command; John C. Leslie, Manager of the Atlantic Division of Pan American Airways; William Littlewood, Vice-President in charge of Engineering, American Airlines; Robert Buck, Pilot Captain, Transcontinental and Western Air; Grover Loening, Consultant on Aircraft, War Production Board; and C. Bedell Monro, President, Pennsylvania-Central Airlines.

The meeting will be held in two separate sessions—one session commencing at 2 P. M. with Mr. Loening as Chairman, the other starting at 7:00 P. M. with Mr. J. Parker Van Zandt of the Brookings Institution as Chairman.

Give 'em the Steel HOT and COLD

For more than two years, we at Atlas have been giving our best in the great war push.

And now that results are beginning to show, we are more eager than ever to follow through with the punch that will down the Axis, once and for all.

Amid the smoke and steam and thunder of our hammers, the fierce heat and glare of our furnaces, we are in the thick of things and we won't let up till it's over over there.

BUY WAR BONDS

ATLAS DROP FORGINGS

ATLAS DROP FORGE COMPANY • LANSING, MICHIGAN

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE AND AVIATION INDUSTRIES

Business activity as a whole remains approximately stable. The seasonally adjusted index of *The New York Times* for the week ended Sept. 25 stands at 138.6, as against 139.4 a week earlier and 130.2 a year ago.

Retail trade has reflected an officially requested curtailment of seasonal special merchandising effort. Department store sales reported by the Federal Reserve Board for the week ended Sept. 25 were 2 per cent larger than in the corresponding period last year. This compares with a gain of 17 per cent reported a week earlier. Sales for the four weeks ended Sept. 25 were 7 per cent above the total a year ago.

Railway freight loadings during the week ended Sept. 25 totaled 907,311 cars, 0.5 per cent more than the preceding weekly figure and 1.1 per cent greater than the comparable number in 1942.

Electric power production increased less than seasonally in the same period but was 17.2 per cent larger than in the like period last year. The comparable gain reported a week earlier amounted to 16.0 per cent.

Crude oil production during the week ended Sept. 25 averaged 4,344,400 barrels daily, 31,350 barrels below the figure for the preceding week and 207,700 barrels less than the average recommended by the Petroleum Administration for War.

Bituminous coal production in the week ended Sept. 18 averaged 2,017,000 tons a day, as against 1,925,000 tons in the week before and 1,885,000 tons a year ago.

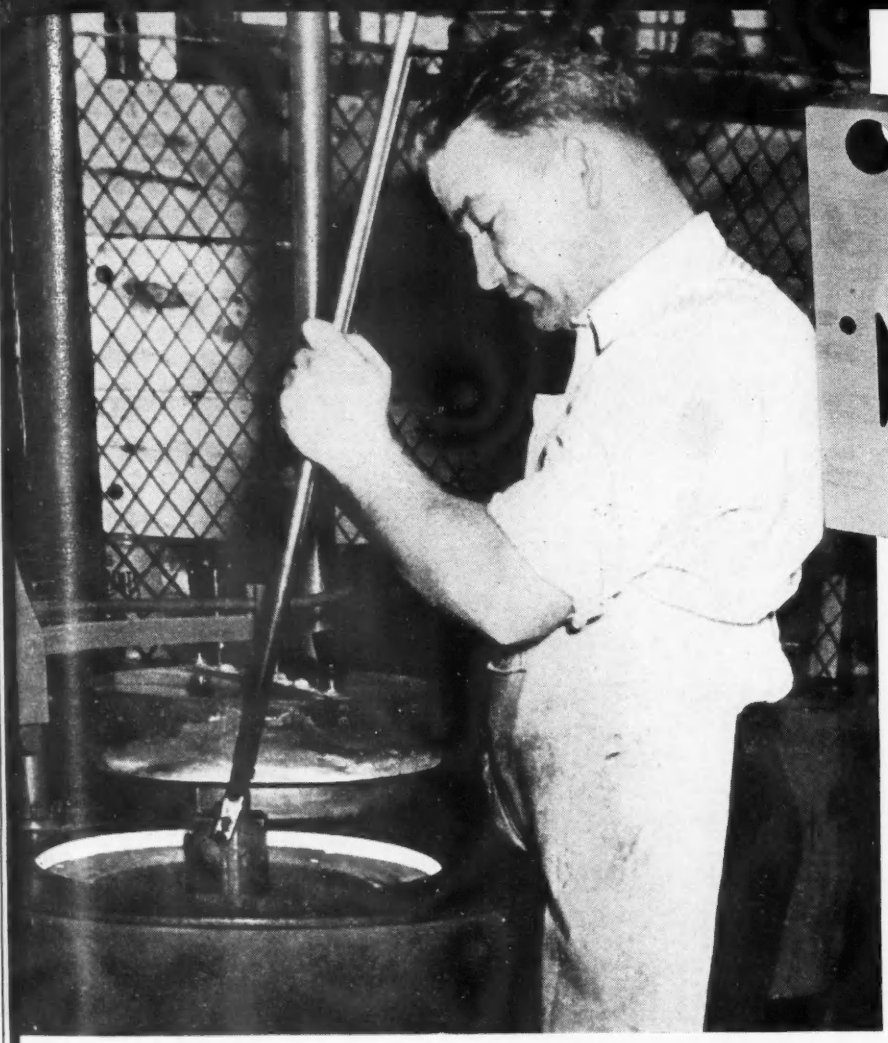
Engineering construction contracts awarded during the week ended Sept. 30 totaled $50,722,000, according to *Engineering News-Record*, as compared with $71,951,000 in the preceding week and $203,321,000 in the corresponding period last year. Total contracts for the year to date are 67 per cent below the comparable 1942 figure.

Professor Fisher's index of wholesale commodity prices for the week ended Oct. 1 stands at 111.1 per cent of the 1926 average, as compared with 111.0 a week earlier and 108.2 a year ago.

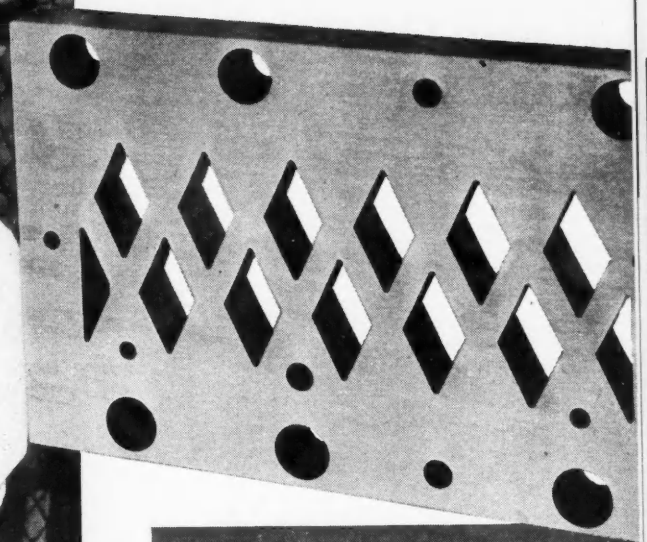
Member bank reserves dropped $433,000,000 during the week ended Sept. 29, and excess reserves declined $80,000,000 to an estimated total of $1,810,000,000. Business loans of reporting member banks increased $140,000,000 during the preceding week but stood $444,000,000 below the total a year earlier.

Babcock Elected a Vice President of GM

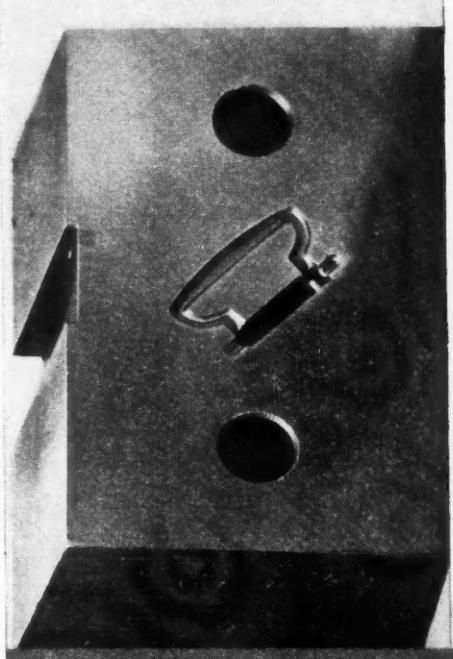
Irving B. Babcock, formerly President and General Manager of Yellow Truck and Coach Manufacturing Co., has been elected a vice-president of General Motors Corp. and appointed general manager of the GM Truck and Coach Division. The latter has become a part of General Motors since the stockholders of Yellow Truck and Coach Manufacturing Co. voted Sept. 8 for the acquisition in exchange for GM stock.



eater-treater placing an embossing die in a Vapocarb-Hump Hardening Furnace



Warp Ended Means No Grinding



Correct Structure Increases Production

Perfect Surface Saves Hours of Polishing

MUST TOOLS PRODUCE MORE?

Vapocarb-Hump Hardening Helps in 3 Ways

During this year's Battle of Production, hundreds of metal-working plants are finding that the Vapocarb-Hump Method of Hardening helps to bring about big increases in the life of punches, dies, hobs and other war-production tools.

If you have a war-goods tooling problem, we'll gladly arrange for you to talk to people in some of these plants. They'll tell you of three ways in which tool life is prolonged: (1) By lessening or ending warp. (2) By better depth of hardness. (3) By ending all surface blemishes.

But, because all three seldom are found in one tool, we're showing here an example of each. You'll understand why these cases must be taken from pre-war production!

Warp Defeated In Perforation Die

A Maryland company used to make 2 or 3 big diamond-pattern perforating dies at a time, because heat-treating warp twisted them "like pretzels," and grinding them straight weakened them and shortened their lives. Vapocarb-Hump hardening, by its uniform heating, ended warp and doubled the lives of these tools.

One Die Does Work of 30

Belt buckle dies were producing an average of 1200 pieces, because the heat-treater could only guess when to quench them, in hardening, and their structure was accordingly weak. Vapocarb-Hump Hardening, by locating *and recording* the critical point, helped increase the production, successively, to 2300 pieces, then 8500, then 18,000 and finally 38,000 — an average of 30 times the pre-Vapocarb figure.

Perfect Surface For Stamping Die

Life of engraved dies, like the one shown, was often shortened because the method of hardening which was employed permitted surface pits or scale to form. These had to be "polished" out, thus weakening the hardened skin. Vapocarb-Hump hardening eliminated this because its protective atmosphere ends all scaling and pitting in furnace; average life of dies has been sharply increased.

Further particulars of Vapocarb-Hump Hardening are given in Catalog T-621, or an engineer will call on request to discuss a specific problem.

Jrl. Ad T-621(27)

LEEDS & NORTHRUP COMPANY, 4966 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

PUBLICATIONS

Westinghouse Electric & Mfg. Co. has just issued a new booklet on **air conditioning and industrial refrigeration.** It illustrates and describes the exclusive Hermetically-sealed compressor and traces its development from the 1932 models up to the present design. It also includes explanations and diagrams concerning the principles of air conditioning and illustrates Westinghouse equipment for air conditioning and industrial refrigeration.*

A new bulletin, **Heat Resistant Lucite Methyl Methacrylate Resin Molding Powder,** has been issued by the Plastics Dept. of E. I. duPont deNemours & Co.*

A new **wrench catalog,** especially designed for busy wartime buyers, has been issued by the Blackhawk Mfg. Co. A Dictionary of Popular Wrench Terms is included, as is also a section illustrating how proper selection of wrenches brings extra speed, safety and ultility to the job.*

General Electric Co. has issued a new 36-page bulletin giving information on the **amplidyne,** a G-E engineering development which harnesses the short circuit and puts it to work. The booklet is well illustrated and describes comprehensively the engineering details and fundamental functions of the **amplidyne.** Another section is devoted to a series of diagrams, with explanatory notes, showing how the **amplidyne** is employed in various applications.

General Electric Co. has also announced new booklets on **Cabinetrol,** a new, simplified system for providing motor control for complex industrial processes, and an 8-page bulletin on **electronic heaters** for heating metals.*

The Resinous Products & Chemical Co. has issued a new bulletin titled **Government Specifications for Plywood and Adhesives.** It describes the four basic specifications that are widely recognized and from which most government specifications are developed, with more or less modification, to meet special requirements.*

A wall chart of **paint spraying rules** has been published by the Eclipse Air Brush Co. The rules apply to all types of spray equipment.*

Fellows Gear Shaper Co. has issued a new circular giving complete description of the design and operation of its new **No. 4 Fine Pitch Gear Shaper.***

Allegheny-Ludlum Steel Corp. has issued a new booklet, **Welding Stainless Steels,** which interprets the technique commercially employed, and much more particularly, the precautions to be observed, in the welding of stainless steels by accepted processes. Please use your company letterhead in requesting copies.*

The American Chemical Paint Co. has issued several bulletins and technical service data sheets on its products, **Deoxidine,** as follows: Booklets, Deoxidine Can Help You Do A Better Rust-Removing and Metal-Cleaning Job; Deoxidine No. 170; Technical Service Data Sheet on Deoxidine No. 170; Deoxidines Nos. 126 and 526. Two additional folders are on Kemick, a chemical paint that endures on hot metals, and Rodine, standard control for fast pickling.*

A new booklet by Dayton Rubber Mfg. Co. is called **Towers of Triumph.** The 44-page booklet contains a chronological story of synthetic rubber. It is attractively illustrated and answers many of the common questions regarding synthetic rubber.*

* Obtainable by subscribers within the United States through Editorial Dept. AUTOMOTIVE *and* AVIATION INDUSTRIES. In making requests for any of these publications, be sure to give date of the issue in which the announcement appeared, your name and address, company connection and title.

Parker Power Tube Bender, built by The Parker Appliance Co., Cleveland, O., employs NOPAK Model A Air Cylinder to extract mandrel.

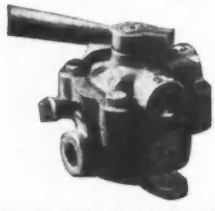
NOPAK
Cylinder Power

Extracts the Mandrel on Tube Bending Operation

Before tubes or pipes are bent on Parker Tube Benders, a mandrel is inserted to prevent crimping at the point of bend. After the bending operation, the mandrel must be extracted without loss of time so the machine can function at top efficiency.

The powerful pull which extracts the mandrel is supplied by a NOPAK Model A Cylinder of proper stroke and diameter. Speed, strength, stamina and adequate pulling power are the basic requirements of air cylinders used on Parker Power Benders.

This application may suggest a new use for NOPAK Cylinders in your plant, or on the machines you build for resale. Write for Illustrated Bulletin No. 86.



NOPAK 2-, 3-, and 4-Way Valves provide positive, precision control of Air and Hydraulic cylinder power. Hand, Foot and Solenoid Operated.

GALLAND-HENNING MFG. CO., 2774 S. 31st STREET, MILWAUKEE 7, WIS.

Representatives in Principal Cities

NOPAK VALVES and CYLINDERS

DESIGNED for AIR or HYDRAULIC SERVICE

A 4180-½I-A

U. S. Rubber Company Now 100 Years Old

Last month the United States Rubber Company observed 100 years of continuous experience in the production of vulcanized rubber goods. The company's Naugatuck, Connecticut plant was the first to start commercial production under the original vulcanization patents and the first product was an overshoe.

CALENDAR

Conventions and Meetings

American Welding Society, Chicago	Oct. 18-23
National Metal Congress, Chicago	Oct. 18-23
The Institute of the Aeronautical Sciences—Natl. Mtg., Washington, D. C.	Oct. 26
SAE Fuels & Lubricants Mtg., Tulsa	Nov. 4-5
Natl. Standard Parts Assoc. Management Planning Conference, Chicago	Nov. 9-10
Natl. Aviation Planning Conference, Oklahoma City	Nov. 11-13
Natl. Aviation Training Assoc., St. Louis—Convention	Dec. 2-4
SAE Annual Mtg. & Eng. Display, Detroit	Jan. 10-14

THERE'S NO EXCUSE FOR LUBRICANT LEAKAGE. . . . Choose the proper type "Perfect" seal, see that its application to the mechanism is correctly engineered and you have the best possible insurance against leakage. Nor will seal permit dust or grit from the outside to enter the housing.

incorporating different packing member materials are made in twelve models to meet varying operating requirements. From these the right seal for your specific application can be selected.

ASK FOR THE RECOMMENDATIONS OF CHICAGO RAWHIDE ENGINEERS

CHICAGO RAWHIDE MANUFACTURING COMPANY

1310 ELSTON AVENUE • CHICAGO, ILLINOIS

65 Years Manufacturing Quality Mechanical Leather Goods
Exclusively and now Sirvene Synthetic Products

PHILADELPHIA • CLEVELAND • NEW YORK • DETROIT • BOSTON • PITTSBURGH • CINCINNATI

NEW
BAKER HY-LIFT TRUCKS
DESIGNED TO MEET MODERN REQUIREMENTS

NOTE:
Baker has re-designed many of its trucks to meet Industry's needs for increased production:
1. Longer continuous operation
2. Faster handling of material
3. Lower maintenance

FOR INCREASED PRODUCTION AND EFFICIENCY

Larger battery box (32" x 39½") permits capacity to operate trucks continuously on longer shifts. Chamfered front top corner of battery compartment provides greater visibility for the driver. Sliding type battery cover is equipped with handles for faster servicing.

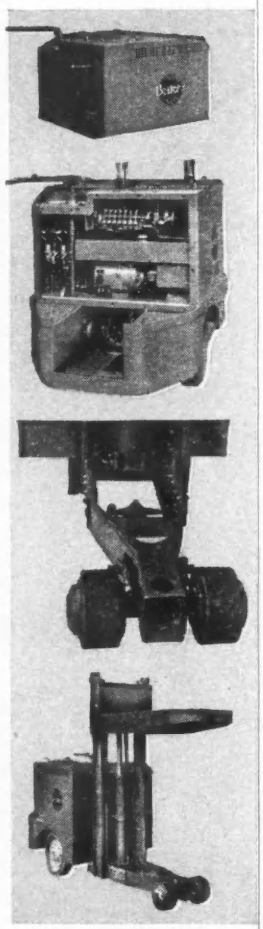
o The same advantages which have been designed into these trucks to speed the production of war goods also apply to normal peacetime material handling. The model illustrated, designated as Type H-3, is of 6,000 lb. capacity.

Improvements include a new hydraulic lift system which provides efficient, positive control of hoisting and lowering, increased battery compartment permitting longer continuous operation, operator's guard integral with frame for greater strength and safety, and other features which provide increased efficiency and easier maintenance . . . The new improved design is also available in 4,000 lb. capacity. (Type H-2.)

Controller, contactors, lift motor and pump are grouped together in a convenient control panel. Travel brake is easily adjusted by a single hex nut. Operator's guard built integral with frame for greater strength, provides handy compartment for carrying towing chain, pinch bar, or other tools

Easy steering results from proper design and anti-friction bearings on king pins. All steering levers and rods are inside frame, protected against damage. Frame members are fabricated of heavy plate by hot riveting and arc welding.

Efficient hydraulic lift provides power lifting and gravity lowering, under absolute control at all times. 67" lift for two or three high tiering is standard.



Write for complete information

BAKER INDUSTRIAL TRUCK DIVISION of the Baker-Raulang Company
2154 WEST 25th STREET • • • • CLEVELAND, OHIO
In Canada: Railway and Power Engineering Corporation, Ltd.

1211-1A-43

Military Demand for Heavy Trucks

(*Continued from page* 56)

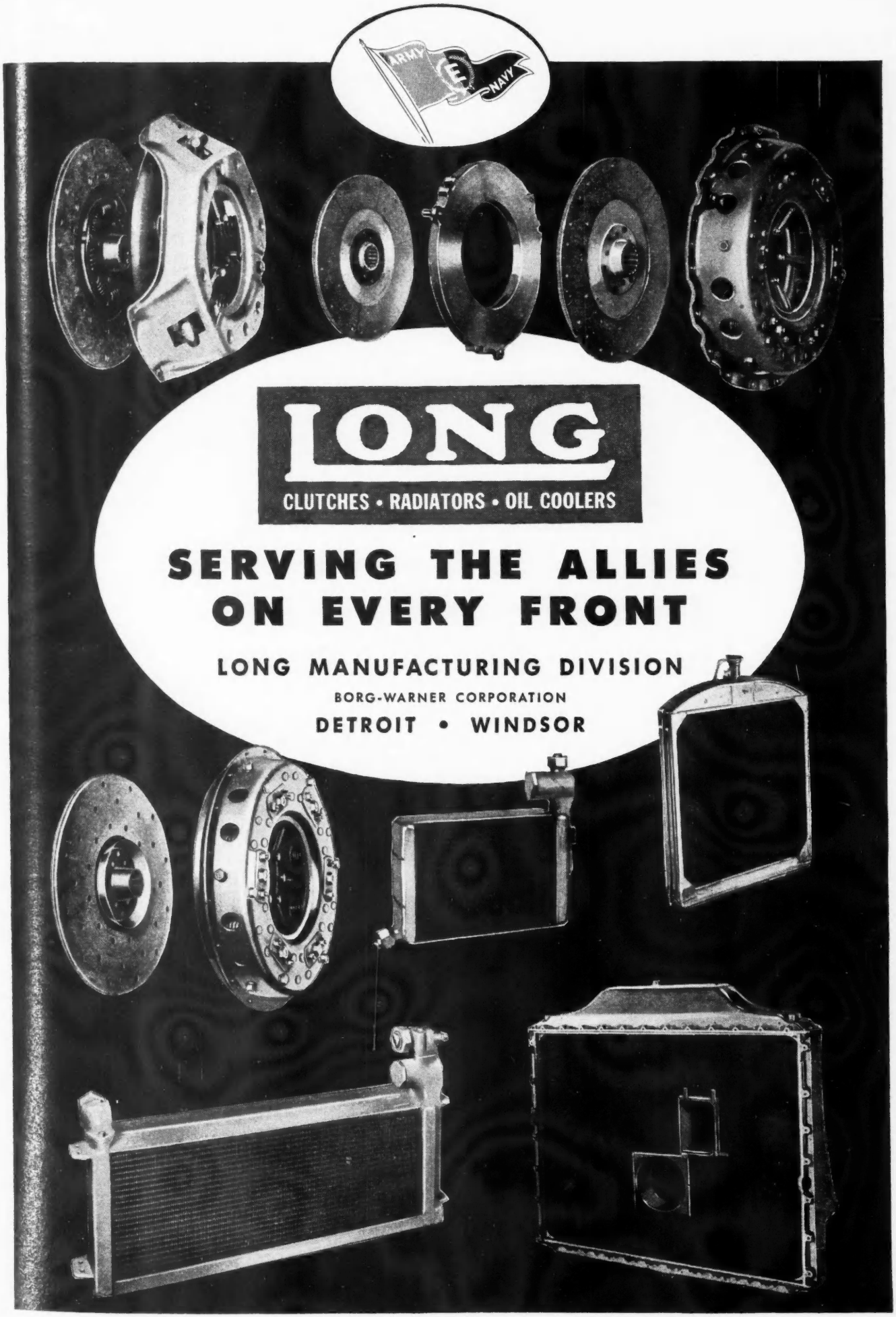
with the Army to develop a new truck for combat use. They finally turned out the ¾-ton 4x4, which has 18 inches less wheel base and 14 inches lower silhouette than the ½-ton model. It also has 2 inches greater clearance, better load distribution and more effective brakes and traction. More than 80 per cent of the parts are interchangeable with the ½-ton type. Initial orders were placed for 70,000 ¾-ton vehicles. Later, need developed for a truck for troop carrying and light, fast cargo work that would substitute for the standard 2½-ton 6x6 model. A 6x6 1½-ton troop and cargo transport truck was perfected by Dodge in cooperation with the Army. This vehicle saves 2,500 pounds of critical materials compared with the 2½-ton model and 95 per cent of the parts are interchangeable with the ¾-ton type. The Dodge Army truck production is second in scope only to tank manufacture among Chrysler's war contracts. It requires 3,000,000 sq. ft. of floor space and 13,000 employees in 10 plants.

Although August aircraft output of 7,612 planes advanced 3 per cent in numbers and 7 per cent in weight over July, government officials continue to point out that production is still behind schedules. August output of airframe weight totaled 59,000,000 pounds, an average of 7,800 pounds per plane compared to 5,600 pounds in August 1942. By August, 1944, the monthly average is expected to reach 10,000 pounds.

Combat vehicle production in August declined 6 per cent from July, reflecting the reduction in tank schedules, but motor vehicle output gained 10 per cent and shipments of self-propelled artillery were up 32 per cent. Anti-aircraft guns and equipment advanced 4 per cent and small arms and infantry weapons were up 5 per cent. The WPB munitions index rose to 618 compared to 100 for November, 1941. August machine tool shipments totaled $87,827,000, a 10 per cent drop from July. The backlog now stands at $386,792,000, a little over four months' production at the August rate.

Nelson, speaking to a British government dinner in London, said that 110,000 military planes had been manufactured in the U. S. since Jan. 1, 1942. During that same period 60,000 tanks and 53,000 scout cars and carriers came off U. S. assembly lines.

One of the major automotive manufacturers of airframe subassemblies is the Briggs Mfg. Co., which produced 14,000,000 pounds of airframe weight in the first nine months of 1943. This compares with 7,000,000 pounds in 1942 and 800,000 in 1941. Briggs supplies airframe parts for seven military planes, including the Boeing B-17, the Martin B-26 and the Vought-Sikorsky FG-1.


ARMY
NAVY
LONG
CLUTCHES • RADIATORS • OIL COOLERS
SERVING THE ALLIES
ON EVERY FRONT
LONG MANUFACTURING DIVISION
BORG-WARNER CORPORATION
DETROIT • WINDSOR

Synthetic Rubber Tires

(*Continued from page* 27)

This is the S-4 classification but production of this type tire, aside from those needed for test purposes, appears to be at least several months away. The industry still hopes to continue to use all natural rubber for the manufacture of high speed bus and truck tires for long distance over-the-road operations, until Jan. 1 and possibly later, depending upon the imports of crude rubber to this country from Ceylon, Liberia, South and Central America. It is essential from a safety standpoint that such tires contain as much natural rubber as possible to insure their standing up.

Rayon rather than cotton cord will be required in the S-4 type synthetic tires and also in the S-6 type if enough rayon is available. The production of high tenacity rayon is being increased by WPB but its usage for civilian motor vehicle tires competes with high priority aircraft and military vehicle tires and self-sealing fuel tanks for airplanes. A second large expansion in the production of rayon cord recently was authorized by WPB, bringing the total increase to 160,000,000 pounds. Plants at Wilmington, Del.; Cleveland and Enca, N. C., are enlarging their capacity to meet the greater demand engendered by the synthetic rubber tire program. In addition, 12 mills have been directed by WPB to confine their production to rayon tire cord and self-sealing fuel tank yarns. This will make it necessary for them to discontinue the manufacture of cotton duck textiles. Rayon cord not only is superior to cotton cord for large tires due to the heat factor but it only requires one pound of rayon cord where a pound and a half of cotton cord is needed. However, output of cotton tire cord for passenger car tires also is being boosted by WPB to an annual total of 270,000,000 lb.

If cotton instead of rayon is used in an S-6 tire, it will have only about 30 per cent of the wear of a pre-war natural rubber tire, because the cotton does not have the heat resistance of rayon. With rayon cord, an S-6 tire probably will have 50 to 60 per cent of the wear of a pre-war tire. However, improvements are being made constantly in the performance of synthetic tires, so what holds true today may be obsolete next month. In peacetime all the development and research work preceded the introduction of a new product. But under the stress of the war-time emergency, research and developmental work are running concurrently with the mass production of the new product because the nation's motor vehicle transportation system cannot afford to wait until improvements in the product are worked out.

It appears that plenty of raw material will be available for the manufacture of synthetic tires thanks to the effective job that William M. Jeffers and his associates in the Office of Rubber Director have done. September output of synthetic rubber is estimated at over 30,000 tons by Col. Bradley Dewey, Jeffers' successor. That amount is approximately as much as the crude rubber consumed by the U. S. in September, 1942. Synthetic rubber production in the U. S. totaled only 4000 tons in 1939, 8000 tons in 1940, 12,000 tons in 1941 and 22,500 tons in 1942. Production this year is expected to reach 275,100 tons, according to the Office of Rubber Director, of which 218,600 tons, or 79 per cent, will be GR-S, 10,900 tons, or 4 per cent, GR-I (butyl), 28,700 tons, or 11 per cent, GR-M (neoprene) and 16,900 tons, or 6 per cent, Buna N. This production of synthetic is equivalent to 254,000 tons of natural crude rubber. Fifty-four thousand tons of natural crude rubber are expected to be imported this year to augment the dwindling stockpiles. All but three of the major synthetic rubber plants were completed when Jeffers resigned early in September and there was no need for rushing the completion of those three because they will depend upon still unfinished 100-octane gasoline plants for their feed stocks of butadiene. Already producing GR-S are U. S. Rubber Co. plants at Institute, W. Va., and Naugatuck, Conn.; Good-

Start with the BEARINGS

• Practically every day we read that a new record of performance has been established. One day it's a plane . . . setting a new mark for speed . . . or altitude . . . or distance. The next day it's a machine tool . . . providing longer hours of operation . . . with greater loads and speeds. These records are possible only when the motive unit operates with the highest degree of efficiency.

SLEEVE TYPE BEARINGS
Any Size
Any Type
Any Quantity

Before any motive unit can operate efficiently it must be equipped with the *correct* type of bearing for each application. That's where we come in. For more than thirty-five years we have helped manufacturers of all types of equipment select the bearing that will deliver the greatest performance.

At the present, all of our manufacturing facilities are engaged in the production of sleeve bearings for armament. But our advice and counsel is available. Simply write us and a Johnson sales engineer will call on you . . . at your convenience.

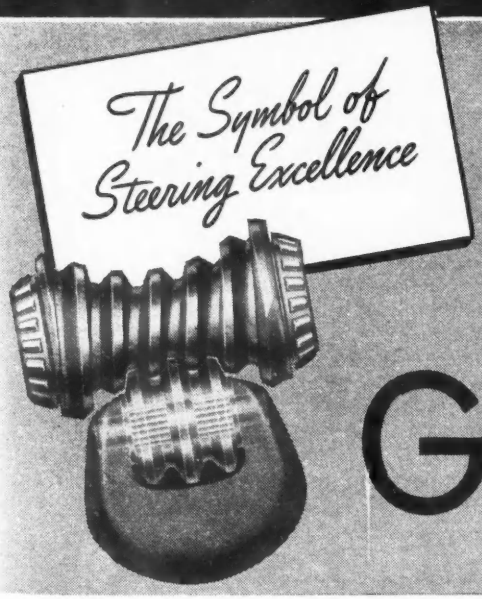
JOHNSON BRONZE
SLEEVE BEARING HEADQUARTERS
The MOST COMPLETE SLEEVE BEARING SERVICE in the WORLD
625 S. MILL STREET NEW CASTLE, PA.

LIBERATOR BOMBER—Gemmer steering devices go to war in these great ships.

P. T. BOAT—By Annapolis Yacht Yard Inc.—Steered by Gemmer.

U. S. ARMY C-2 WRECKER—Federal Truck—Steered by Gemmer—Used to pick up downed planes and return them to repair bases—to remove and replace plane engines and general utility.

GEMMER WITH ALL THE *Armed Forces*



Versatility in the field of Steering is well demonstrated in Gemmer's service.

Gemmer apparatus is used in many planes — many small boats, and a wide variety of military vehicles for land. Excellent service with minimum maintenance is its proud record.

Gemmer MANUFACTURING CO.
6400 MT. ELLIOTT AVE. • DETROIT 11, MICH.

AIRCRAFT Standard PARTS CO.

NOW! SMALL SIZE

"Aero-Seal"
HOSE CLAMPS

With the introduction of our new models M-6 and M-10, shown above, we are able to offer a full line of APPROVED hose clamps.

FOR 1/4", 3/8", 1/2", 5/8", 3/4" HOSE

Our M-6 clamp is designed for 1/4", 3/8", and 1/2" (nominal I.D. size) hose, and our M-10 for 5/8" and 3/4" hose. When necessary, the M-10 may be used for all 5 sizes, from 1/4" through 3/4". This overlapping coverage extends throughout the "Aero-Seal" line of 16 clamp sizes up to 4".

WIDE CLAMPING RANGE

ALL "Aero-Seal" Hose Clamps feature this wide clamping range. The band is perforated for a long take-up, permitting the clamp to be used on several hose sizes. Also featured is the belt-like tightening action which produces uniform clamping pressure around the entire periphery. These points make "Aero-Seal" Hose Clamps specially good for self-sealing hose. Write for full information.

"AERO-SEAL" HOSE CLAMPS NOW IN ALL SIZES 1/4" TO 4"

AIRCRAFT STANDARD PARTS CO.

1711 19th Ave., Rockford, Illinois

year plants at Houston, Tex., Los Angeles, and Akron; Firestone plants at Lake Charles, La., and Akron; Goodrich plants at Port Neches and Borger, Tex., and Louisville; and General Tire & Rubber Co. at Baytown, Tex. Most of these plants are owned by the Defense Plant Corp. and operated by private companies. More than a third of the synthetic rubber industry will be concentrated in Texas, whose synthetic plants will have annual capacity of 255,000 tons. A $650,000,000 industry with eventual annual capacity of 850,000 tons has been established in less than two years' time. It will be composed of 48 plants, 14 producing GR-S, three making butyl and one turning out neoprene. There also will be 23 plants producing butadiene and seven making styrene for conversion into GR-S. Capacity annual output of 850,000 tons will be comprised of 735,000 tons, or 86 per cent, GR-S; 75,000 tons, or 9 per cent, butyl, and 40,000 tons, or 5 per cent, neoprene.

The obstacles to reaching the goals of the 1944 tire production program are lack of sufficient facilities and manpower. GR-S is more difficult to mill and handle in the factory than natural rubber. The processing efficiency is considerably less. The mixing and calendaring operations take 15 to 25 per cent longer and additional Banbury mixers and vulcanizing equipment are necessary if comparable output is to be achieved. The industry has ordered 100 Banbury mixers, which cost approximately $100,000 apiece, and early delivery will be at the rate of four or five a month. The milling cycle is longer, tubing time is reduced and building time increased because GR-S stocks lack "tack," the property of sticking together in layers. This slows the building up of tire casings and will make necessary more tire machines and skilled manpower. One company found out that it could process GR-S on existing plant equipment 95 per cent as well as natural rubber but of course the operations take longer. GR-S also requires a larger amount of carbon black for compounding.

With tire manufacture scheduled to increase sharply next year, an acute shortage of trained labor appears in prospect. From December, 1941, until March, 1943, the only passenger car tires produced for civilian use were 1,000,000 war emergency tires of reclaimed rubber, with only limited mileage. During that period many tire makers were transferred to other phases of the rubber industry's war program. Also, many thousands of skilled tire makers have joined the armed forces. Women are being trained for many tire manufacturing operations that formerly were limited to men. However, due to the heavy nature of the work, male labor must be employed for the larger sizes of truck tires. Some plants have tire-making equipment idle for lack of trained manpower. A reconversion program must be undertaken by the industry in many plants, both of men and machinery, and thousands of new workers must be hired if the 1944 tire program is to be fulfilled. Goodyear is reconverting its plant at Jackson, Mich., from the manufacture of anti-tank guns back to tire building but manpower must be trained before full production can be reached. The U. S. Rubber Co. plant at Eau Claire, Wis., also is reverting back to tire production after turning out small arms ammunition for more than a year. The Kelly-Springfield plant at Cumberland, Md., is returning to the manufacture of tires, too, after making ammunition for the Army. All these plants must put their tire-making machinery back in operating condition before actual production gets under way. In addition two small Government financed plants will be built to manufacture commercial and military vehicle tires.

Making the fullest use of available facilities and having labor produce efficiently are two goals that must be realized if the 1944 tire objectives are to be attained. That these hopes are falling short of expectations was indicated by Jeffers in a letter to the presidents of the tire companies just before he left office.

Several rubber companies have taken action through management-labor cooperative committees calling for campaigns to reduce absenteeism, introduce incentive pay and lift union-imposed production limits.

If the labor shortage does not become too acute, the industry expects to produce 6,000,000 synthetic passenger car tires this year and reach its goal of 30,000,000 passenger car tires next year. But the outlook for commercial vehicle tires is not so optimistic. The needs of the military vehicle program take a large segment of the industry's commercial tire-making capacity. The average size of the tires needed has moved up while the unit productive capacity of the industry has gone down. A machine that can make 25 to 30 7.50 x 20 tires a day may be able to produce only fifteen 12.00 or 13.00 x 20s. It is estimated that slightly more than 13,000,000 military and commercial vehicle tires will be produced this year, of which 4,500,000 will be for replacement on civilian trucks. Peak capacity of the industry next year is estimated at 15,000,000 truck tires. But demand for civilian replacement is expected to increase at least 50 per cent due to the shorter life of synthetic tires and the wearing out of older tires now on the road. The program for producing 33,852 medium and heavy trucks and 14,067 trailers for civilian use next year also will require additional tires.

Even now holders of ration certificates for commercial vehicle tires often are unable to purchase them. Many large fleet operators hold 50 to 100 unredeemed certificates and the total deficit in truck tires may run up to 200,000 units by the end of the year. Supplying of this huge demand will depend upon the requirements of the military vehicle program and the ability of the industry to utilize its facilities to the utmost through full employment.

Commercial vehicle operators will have to observe closely tire conservation measures by avoiding overloads, cutting speeds to the 35 mph war limit and making tire repairs promptly if they are to prolong the life of their synthetic tires. Although ODT permits a 20 per cent gross overload for trucks, tire engineers are unanimous in holding that this rule is injurious to the performance of synthetic tires. This ODT sanction does not guarantee tire performance and the tire engineers maintain that operators cannot expect synthetic tires to do what natural rubber tires did. The 20 per cent overload allowance often results in individual tires, such as those on the rear wheels or the inside duals, carrying a 40 to 60 per cent overload. This may mean the early breakdown of a synthetic rubber tire, whose life at best will be somewhat less than its natural rubber counterpart. Tire engineers say no overloading should be allowed.

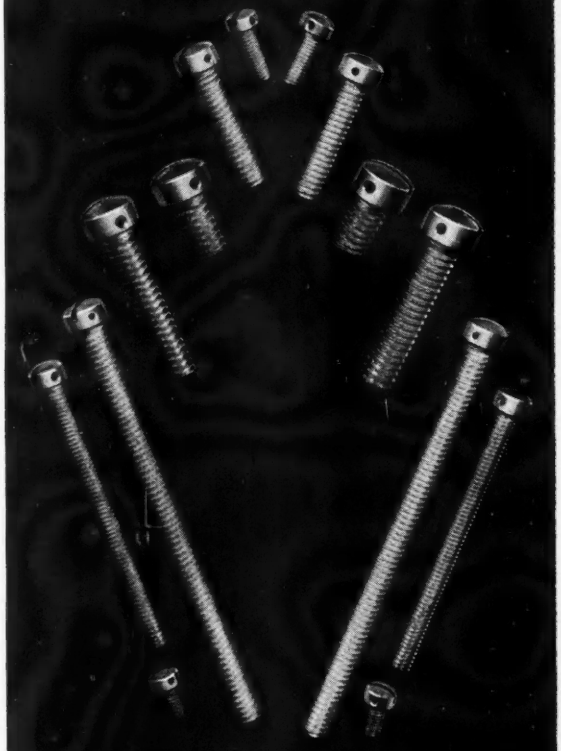
Maintaining of proper inflation is more important in synthetic tires. Over-inflation aggravates cracking and under-inflation subjects tires to abnormal strains. Cuts and bruises in synthetic tires must be repaired promptly because they grow very rapidly and to a degree that failure of the tire is likely to occur. Apparently this is due to a structural deficiency or lack of fiber in GR-S. One manufacturer recommends that the new synthetic passenger car tires be inspected inside as well as out every 2500 miles for small cuts and bruises. This company also advises cross switching synthetic tires every 2500 miles to insure even tread wear and to have wheels aligned and balanced and brakes adjusted periodically at the same mileage.

Maximum prices for synthetic tires and tubes in the main have been set the same as ceiling prices for corresponding tires and tubes of crude rubber by OPA. Production costs are higher for synthetic tires and tubes but the industry agreed with OPA there has not been enough manufacturing experience with the new products to make a permanent decision. This preserves the "status quo" on tire prices until such time as there is evidence to indicate that a change is justified.

Passenger car tubes as well as tires are now being made of GR-S. They are somewhat heavier than natural rubber tubes. GR-S tubes are proving reasonably satisfactory but they exhibit the same deficiency as GR-S tires, notably a tendency to tear more easily and a consequent need for more care in mounting and repairing them. Tubes made of GR-I (butyl) show more promise than GR-S but so far the availability of GR-I has been limited due to

AERO SCREW COMPANY

DRILLED FILLISTER HEAD MACHINE SCREWS



Standard screws for all assembly operations where lock wire is required. MANY STOCK SIZES NOW AVAILABLE FOR IMMEDIATE DELIVERY. Sizes range from 4-48 x 3/16 to 5/16-18 x 3 in low carbon steel, and from 6-40 x 1/8 to 5/16-18 x 2 in heat-treated nickel steel. Made to specifications AC500A, AC501A, AN502, and AC503. Highest quality material and workmanship. Threads are clean and sharp, heads upset and turned to size, slots and holes well burred, plating bright and uniform.

Write for Catalog and Engineering Data

Gives complete information on Drilled Fillister Head Machine Screws, Steel Drilled Head Aircraft Bolts, Hexagon Head Bolts, Clevis Bolts and Pins, Washer Head Screws, and Threaded Taper Pins.

AERO SCREW COMPANY

19th Ave. at 12th St., Rockford, Illinois

slowness of these plants in reaching quantity production. The aviation gasoline program competes with butyl rubber for isobutylene, one of its important ingredients, and 64,000 tons of proposed GR-I capacity were cancelled out due to a revision in the rubber program earlier in the year. The government program calls for 10,900 tons of GR-I this year, 4 per cent of the year's probable output. GR-I tubes hold air better than natural rubber. GR-I is less likely to crack than GR-S and holds its shape better. One rubber research expert believes that GR-I may be preferred over natural rubber in tubes even when natural rubber is available again in quantity.

Camelback for recapping tires is being made of GR-S, a red stripe on the edge identifying its composition. Grade A for retreading truck and taxi tires will contain a minimum of 70 per cent GR-S, while Grade C will contain 45 to 50 per cent. Both compare favorably with natural rubber recaps under normal operating conditions but the GR-S still is likely to generate heat and to crack or chip at excessive speed or with an overload. The Office of Rubber Director hopes to make available material for 2,500,000 retreads monthly. These retreads will be an important factor in keeping essential civilian vehicles, for the transportation of war workers, rolling next year.

National Metal Congress

(*Continued from page* 37)

On Wednesday afternoon, Oct. 20, in addition to the session on post-war planning in non-ferrous metals, a simultaneous session will take up modern practices in surface hardening, including such topics as gas carburizing, hard layers on tool steels, and differential hardening.

Another session Wednesday afternoon will deal with control of quality by inspection, with an important discussion of the inspection during ammunition manufacture. This session will also take up the personal equation in inspection, precision measurements, and the statistical analysis of test results.

National Emergency Steels will occupy the session Wednesday evening, Oct. 20. Use of these new steels in aircraft and engines, as well as their general utility will be discussed, with a look at post-war prospects for these leaner alloy steels.

Salvaging the metal, including the recovery of battlefield scrap, will be discussed in one of the simultaneous sessions Thursday afternoon, Oct. 21. The use of brass cartridge and aluminum scrap will be discussed along with the saving and disposal of tool steel scrap, including grindings.

Magnesium and magnesium alloys will feature one of the final sessions Friday afternoon, Oct. 22. The other session will deal with special finishes and metallic protection, discussing cleaning prior to finishing, electrotinning, plating and plastic coatings.

These ASM War Production sessions will be held each afternoon and evening during the week, except Thursday and Friday evenings in the Palmer House, where more than 160 manufacturers will have War Conference Displays on the 7th, 8th and 9th floors of the hotel. Many of these discussions can be carried further with executives and engineers of manufacturers in the various branches of the metal industry in these Conference rooms. These practical sessions are all in addition to the technical and professional program of the Society to be held each morning in the Palmer House.

The following societies will again cooperate in the metal congress:

American Society for Metals.

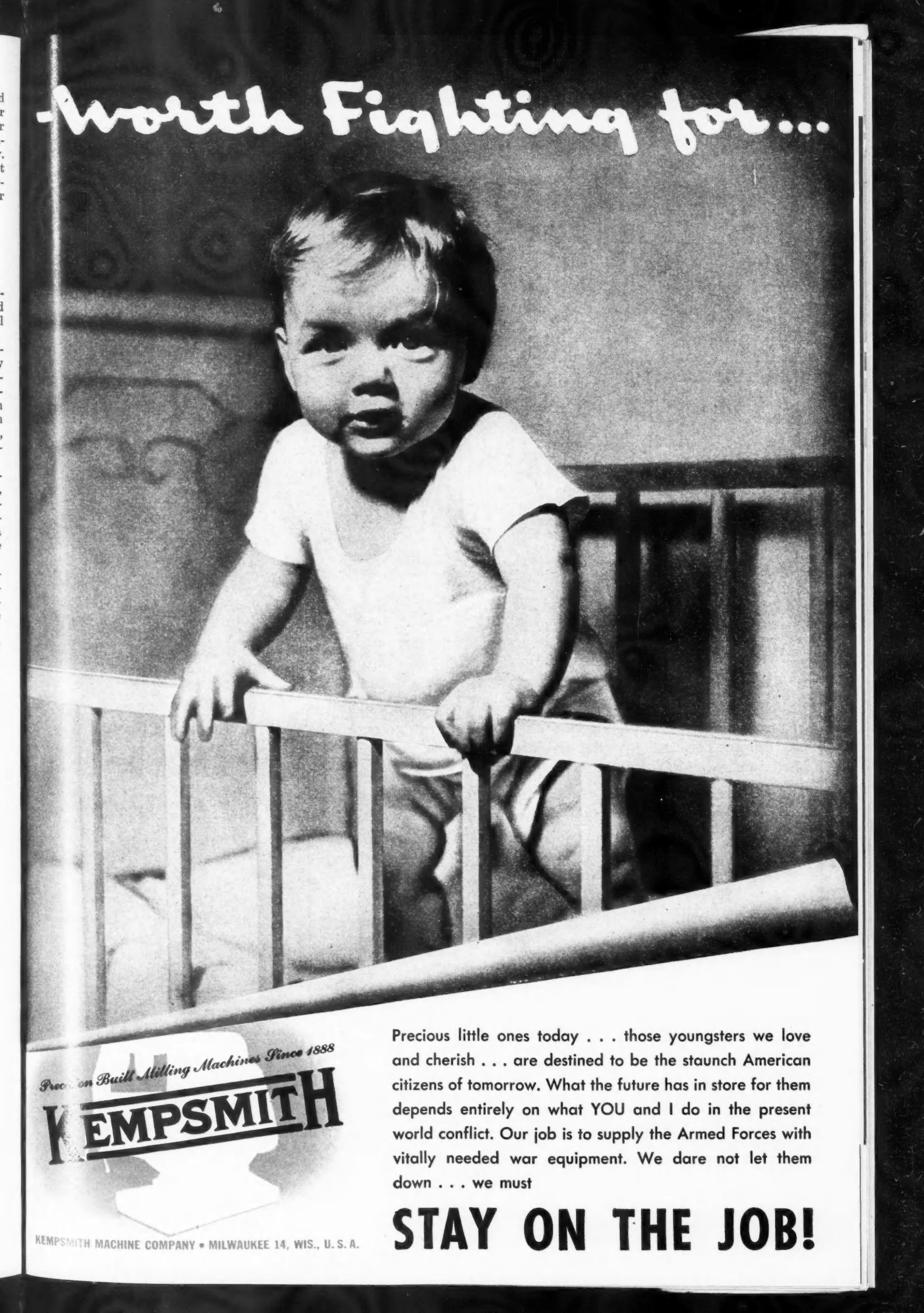
American Institute of Mining and Metallurgical Engineers, Institute of Metals Division and Iron and Steel Division.

American Welding Society.

Wire Association.

The technical programs of these societies, as well as the program of technical papers of the A.S.M., appear on pages 36-37 and continued on pages 82 and 84.

Curtiss Dive Bomber, 1928, for the Navy, powered by Pratt & Whitney 9-cylinder Wasp engine, 425 h.p. Curtiss SB 2C-1 Dive Bomber powered by Wright Cyclone engine, 1500 h.p. in 1942. In both planes, as in all U. S. combat planes, today, major forgings, by WYMAN-GORDON.
WYMAN · GORDON
WORCESTER, MASSACHUSETTS
HARVEY, ILLINOIS - DETROIT, MICHIGAN



Precision Built Milling Machines Since 1888

KEMPSMITH

Precious little ones today . . . those youngsters we love and cherish . . . are destined to be the staunch American citizens of tomorrow. What the future has in store for them depends entirely on what YOU and I do in the present world conflict. Our job is to supply the Armed Forces with vitally needed war equipment. We dare not let them down . . . we must

STAY ON THE JOB!

KEMPSMITH MACHINE COMPANY • MILWAUKEE 14, WIS., U. S. A.

Program—American Welding Society

(*Continued from page* 37)

The Spot Welding of Heavy Gauges of Carbon and Alloy Steels, by John C. Barrett, Taylor-Winfield Corp.

The Spot Welding of the Carbon Steels S.A.E. 1020, S.A.E. 1035 and S.A.E. 1045 in the 0.040-In. Thickness, by Wendell F. Hess, Rensselaer Polytechnic Institute.

9:30 a. m.—Session on Tubing

Welded Steel Tubing—Quality Control and Application, by R. D. Malm, Clayton Mark & Co.

Machine Welded Metal Tubing, by G. C. Gridley, Mechanics Universal Joint Div., Borg-Warner Corp.

Oxy-Acetylene Tube Welding, by A. C. Weber, Laclede Steel Co.

9:30 a. m.—Session on Flame Hardening and Hard Facing

Ordnance Flame Hardening, by S. Smith and J. G. McIlhiney, Air Reduction Sales Co.

Hard Facing in the War on Wear, by J. A. Gallaher, Haynes Stellite Co.

Hard Facing, by F. G. Jones, Wall-Colmonoy Corp.

9:30 a.m.—Session on Ships

Welding in Ship Construction, by H. A. Matis and A. M. Unger, Pullman-Standard Car Mfg. Co.

Prefabrication of Welded Ships in a Structural Steel Plant, by E. T. Blix and J. C. Arntzen, Mississippi Valley Structural Steel Co.

Control of Welding in Ship Construction, by R. W. Brendle, Tampa Shipbuilding Co.

2:00 p. m.—Session on Resistance Welding

Why the Weld Recorder, by J. R. Fetcher and J. van den Beemt, E. G. Budd Mfg. Co.

Double Pressure Systems as Applied to Resistance Welding Machines, by S. M. Humphrey, Taylor-Winfield Corp.

Stored Energy Welding of Mild Steel, by J. M. Diebold, Yellow Truck and Coach Mfg. Co.

Flash Welding of Nickel and High Nickel Alloys, by W. F. Hess and A. Muller, Rensselaer Polytechnic Institute.

2:00 p. m.—Session on Ships

Planning for Production Welding and Cutting in Modern Shipyards, by W. B. Bowen, Ingalls Shipbuilding Corp.

Thermit Welding in Maritime Commission work, by J. H. Deppeler, Metal and Thermit Corp.

Longitudinal Welded Joints, by A. G. Bissell, Bureau of Ships, Navy Dept.

2:00 p. m.—Research Session

Fatigue Strength of Fillet Welded Joints, by W. M. Wilson, University of Illinois.

Some Notes on Evaluating the Weldability of Alloy Steels, by Lt. S. A. Herres, Watertown Arsenal.

Investigation of a Normalizing Procedure to Improve the Grain Structure of Welds in Carbon-Molybdenum Pipe, by I. A. Rohrig, D. H. Corey and Sabin Crocker, The Detroit Edison Company.

Correlation of Structure and Strength of Spot Welds in Aluminum Alloys, by Dana Smith and F. Keller, Aluminum Company of America.

7:30 p. m.—University Research Conference

Wednesday, October 20

9:30 a. m.—Aircraft Session

Fatigue Strength of Welded Aircraft Joints, by T. V. Buckwalter, The Timken Roller Bearing Co.

The Spot Weldability of Low Carbon and other Aircraft Steels, by L. C. Bibber and Julius Heuschkel, Carnegie-Illinois Steel Corp.

Weldability Tests of Aircraft Structural Steels, by C. B. Voldrich and R. D. Williams, Battelle Memorial Institute.

9:30 a. m.—Non-Ferrous Welding and Brazing

Modern Welding Methods for Copper and Copper Alloys, by J. J. Vreeland, Chase Brass and Copper Co., Inc.

Carbon Arc Welding of Naval Brass, by Kenneth L. Walker, Foster Wheeler Corp.

Aluminum Brazing Sheet—Fundamentals of Metal Flow, by M. A. Miller, Aluminum Research Laboratories.

9:30 a. m.—Session on Piping

Oxy-Acetylene Distribution Systems, by D. F. Guthrie and R. W. Stewart, Air Reduction Sales Co.

Large Welded Pipe Lines, by L. G. Christofferson, Chicago Bridge & Iron Co.

Weldability of 27 per cent Chrome Steel Pipe, by R. A. Mueller, I. H. Carlson and E. R. Seabloom, Crane Co.

2:00 p. m.—Aircraft Session

The Heliarc Welding of Magnesium Alloys as Used in Airplane Fabrication and Substitution for Critical Materials, by T. E. Piper, Northrop Aircraft, Inc.

Fatigue Studies of Welded Test Triangular Structures with NE8630 Steels, by A. J. Williamson, Summerill Tubing Co.

Fabrication and Welding of Aircraft Exhaust Tubing—Manifolds and Headers, by C. D. LaFond, Buhl Stamping Co.

Metallic Arc Welded X-4130 Steel Tubing, by W. T. Tiffin, University of Oklahoma.

FOR THAT *NEW* MODEL . . .

LOW WEIGHT • COMPACT DESIGN

WITH A BLACK & DECKER MOTOR

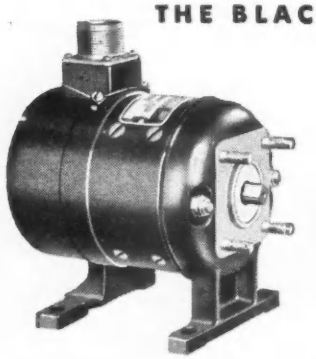
★

AWARE of the important advantages of low weight and compactness, many design engineers are already specifying Black & Decker special application motors in their "blueprints for tomorrow."

Designing the motor for your particular application frequently permits not only a reduction in motor weight because of higher efficiency, but a decrease in weight of the product itself.

Because of these and other important reasons, we recommend discussing the motor in the *early* stages of product development.

THE BLACK & DECKER ELECTRIC CO.
KENT, OHIO



THOROUGH ENGINEERING is the basic factor behind the successful operation of this hydraulic pump motor and many other fractional horsepower motors we have designed for all types of equipment.

Black & Decker
FRACTIONAL HORSEPOWER SPECIAL APPLICATION MOTORS

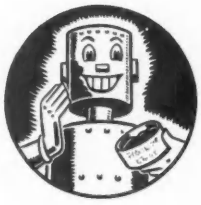
HOUGHTON'S

"Facial treatments" for steel

For surface protection . . . RUST PREVENTIVES

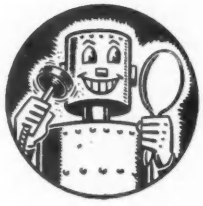
Steel and steel parts shipped over the seven seas require protection against *rust*, the enemy of ferrous metals. Procedures today have been standardized; "specs" are provided which Houghton rust preventives meet and exceed. These products include thin-film hard drying types, waxy coatings, water-displacing types, and medium or heavy grease varieties.

For improved appearance . . . BLACKENING



HOUGHTO-BLACK, the low-temperature blackening bath that adds lustre and protection to bare metal, is the second type of "facial" for steel. Its finish is durable and does not alter dimensional sizes. Write for the Houghto-Black folder.

For toughness . . . CARBURIZING



Houghton's PERLITON Liquid Carburizer is not merely a "facial", of course. Its penetration is deep, uniform and rapid. The carbon case it provides is similar to that obtained from pack-hardening. Houghton also provides energized solid materials in all meshes for pot carburizing.

"Save the surface and you save all" applies to steel as well as to wood. To protect your steels against either weather or wear, investigate these Houghton products of research which have helped the metal industry for three-quarters of a century.

E. F. HOUGHTON & CO.

Heat Treating and Metal Working Products

PHILADELPHIA CHICAGO DETROIT SAN FRANCISCO TORONTO

2:00 p. m.—Session on Inspection, Qualification and Training

Symposium on Applicable Methods of Inspection of Arc Welding for (1) Shipbuilding, by J. Lyell Wilson; (2) Structural, by R. B. Lincoln; (3) Pressure Vessels and Piping, by W. D. Halsey; (4) Aircraft, by J. B. Johnson; (5) Machinery, by N. L. Mochel.

General Problems of Training Welding Operators, by A. N. Kugler, Air Reduction Sales Co.

2:00 p. m.—Session on Repair and Maintenance

Bronze Welding in the Design and Maintenance of Forming Dies, by C. E. Swift, Ampco Metal, Inc.

The Job Shop—Past, Present and Future, by F. W. Shackleton, Central Ohio Welding Co.

Maintenance of Tools and Equipment, by T. B. Jefferson, The Welding Engineer.

Reclamation of Tools by Low Temperature Brazing, by W. A. Johnson, International Harvester Co.

7:30 p. m.—Section Officers Dinner and Conference

Thursday, October 21

9:30 a. m.—Aircraft Session

Quality Control of Aircraft Spot Welding, by Nathan C. Clark, Lockheed Aircraft Research Laboratory.

The Application of Flash Welding in Airplane Construction, by C. B. Smith, Douglas Airplane Co.

Spot Weld Joint Efficiency for Aluminum Alloys, by C. W. Steward, Curtiss-Wright Corp. Research Laboratory.

Spot Welding of Magnesium Alloys, by W. S. Loose, Aircraft Welding Research Committee WRC.

9:30 a. m.—Production Session

Automatic Arc Welding Solves Production Problems, by R. F. Wyer, General Electric Co.

Transition from Riveted to Welded Construction of Light Tanks, by Wm. Osha and J. W. Sheffer, American Car and Foundry Co.

Welding of Armored Tanks, by William Boese, Pullman Standard Car Mfg. Co.

9:30 a. m.—Session on Pressure Vessels

War Emergency for Welded Pressure Vessels, by E. R. Fish, Hartford Steam Boiler Inspection & Insurance Co.

The Hammer Test for Welded Pressure Vessels: an Investigation, by C. O. Dohrenwend, Armour Research Foundation.

2:00 p. m.—Business Meeting

3:00 p. m.—Board of Directors Meeting

by

DETREX METAL CLEANING PROCESSES

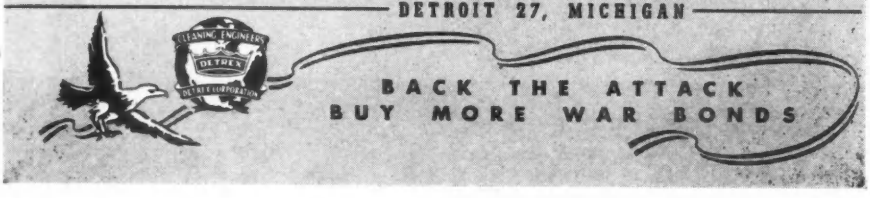
From the depths of the sea to the stratosphere, instruments are playing a most vital part in this war. In many cases, it has been the ingenuity of the instrument makers that has given the United Nations superiority in various phases of offense and defense.

The very nature of instrument parts—specified to the highest degree of precision and finish—requires that only the most thorough methods of metal cleaning be employed in their manufacture. It is significant that millions of these parts are effectively cleaned in Detrex machines with Detrex metal cleaning chemicals.

In the production of many other types of war materiel—shells, aircraft, guns, mobile apparatus as examples—Detrex War Production Cleaning is also helping to speed operations and reduce costs.

DETREX CORPORATION

DETROIT 27, MICHIGAN



Program for American Society for Metals

(*Continued from page 36*)

and Structure, by Carl F. Floe, The Nitralloy Corp.

The Action of Carbonate Catalysts in the Carburization of Steel, by T. C. Fong, and R. A. Ragatz, University of Wisconsin.

The Isothermal Transformation of Case-Carburized S.A.E. 4815, by J. R. Cruciger and J. R. Vilella, United States Steel Corp.

Wednesday Morning, October 20

Annual Meeting of American Society for Metals—Edward de Mille Campbell Memorial Lecture, by C. H. Mathewson, Professor of Metallurgy, Yale University.

Thursday Morning, October 21

Order Hardening: Its Mechanism and Recognition, by David Harker, General Electric Co.

Interrupted Quench and Isothermal Treatments of Precipation Hardening Alloys: Introductory Notes, by R. H. Harrington, General Electric Co.

Simultaneous Session

Bright Gas Quenching of S.A.E. X-4130 Welded Aircraft Tubes, by Wm. Lehrer, Surface Combustion.

Some Effects of Heat Treatment on Low Alloy Titanium Steels, by George F. Comstock, Titanium Alloy Manufacturing Co.

Effect of Time, Temperature and Prior Structure on the Hardenability of Several Alloy Steels, by J. Welchner, E. S. Rowland and J. E. Ubben, Timken Roller Bearing Co.

Simultaneous Session

The Stress Distribution at the Neck of a Tension Specimen, by P. W. Bridgman, Harvard University.

Notched Bar Tensile Test Characteristics of Heat Treated Low Alloy Steels, by G. Sachs, J. D. Lubahn and L. J. Ebert, Case School of Applied Science.

The Strength of Heat Treated Alloy Steel Bolts, by G. Sachs, P. S. Cole and R. A. Roth, Case School of Applied Science.

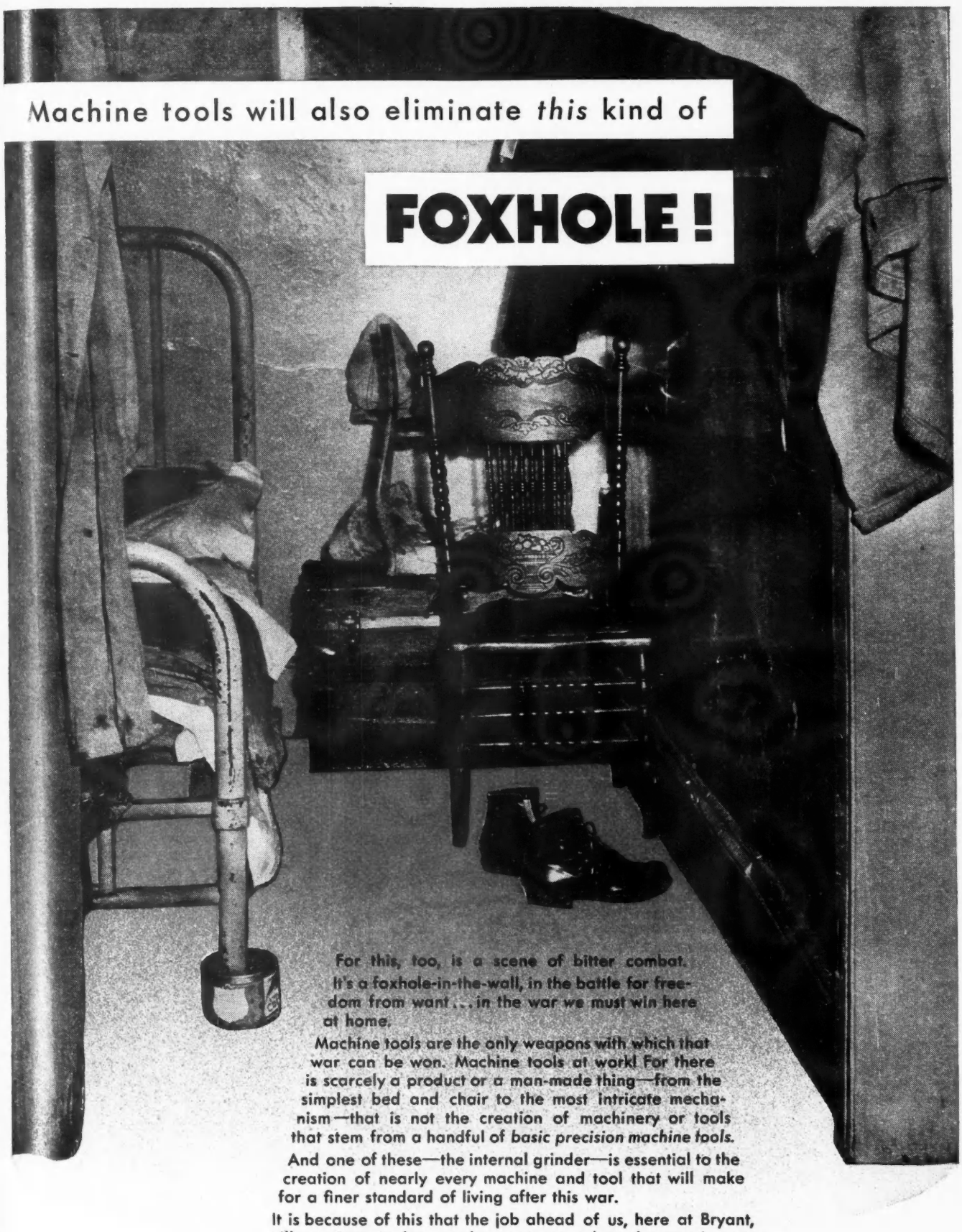
Friday Morning, October 22

The Emissivity of Molten Stainless Steels, by George N. Goller, Rustless Iron and Steel Corp.

Quenching Rate Versus Graphite Formation in Pre-quenched White Cast Iron, by Orien W. Simmons, Battelle Memorial Institute.

Pseudomorphs of Pearlite in Quenched Steel, by Owen W. Ellis, Ontario Research Foundation.

Structural Changes During the Tempering of High Carbon Steel, by D. P. Antia, S. G. Fletcher and Morris Cohen, Massachusetts Institute of Technology.



Machine tools will also eliminate *this* kind of

FOXHOLE!

For this, too, is a scene of bitter combat. It's a foxhole-in-the-wall, in the battle for freedom from want . . . in the war *we* must win here at home.

Machine tools are the only weapons with which that war can be won. Machine tools at work! For there is scarcely a product or a man-made thing—from the simplest bed and chair to the most intricate mechanism—that is not the creation of machinery or tools that stem from a handful of *basic precision machine tools.*

And one of these—the internal grinder—is essential to the creation of nearly every machine and tool that will make for a finer standard of living after this war.

It is because of this that the job ahead of us, here at Bryant, will continue to be a truly great one when the war is won.

Call on us!

BRYANT CHUCKING GRINDER COMPANY Springfield, Vermont, U. S. A.

The Effect of Carbon on the Tempering of Steel, by Stewart G. Fletcher and Morris Cohen, Massachusetts Institute of Technology.

The Tempering of Nickel and Nickel-Molybdenum Steels, by Dara P. Antia and Morris Cohen, Massachusetts Institute of Technology.

Effect of Quenching-Bath Temperature on the Tempering of High Speed Steel, by Paul Gordon and M. Cohen, Massachusetts Institute of Technology, and R. S. Rose, Vanadium-Alloys Steel Co.

Simultaneous Session

An Emergency Heat Resistant Alloy, by O. E. Harder and James T. Gow, Battelle Memorial Institute.

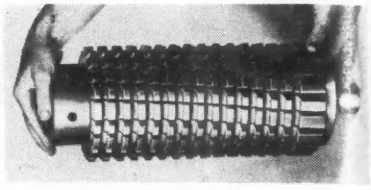
An Optimum Silicon Range in Plain and 2.0 Per Cent Chromium Cast Irons Exposed to Elevated Temperatures, by C. O. Burgess and R. W. Bishop, Union Carbide & Carbon Res. Labs.

Creep Strength, Stability of Microstructure and Oxidation Resistance of Chromium-Molybdenum and Chromium-Nickel Steels, by R. F. Miller, W. G. Benz and M. J. Day, United States Steel Corp.

New Production Equipment

(*Continued from page* 42)

ONE of the largest multiple thread milling cutters ever produced is offered by the Plan-O-Mill Corporation, Hazel Park, Mich., for threading gun tubes, breech blocks, and other internal and externally threaded parts up to 16 in. in diameter. The cutter is 12¾ in. long and 6½ in. in diameter. It also



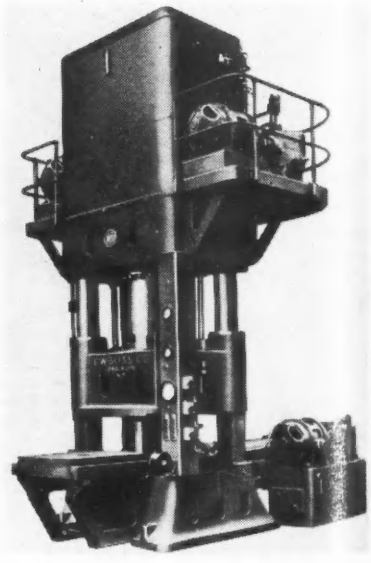
Large multiple thread milling cutter made by Plan-O-Mill Corp.

provides the Higbee cut, by which the imperfect thread is removed coincidental with milling the thread.

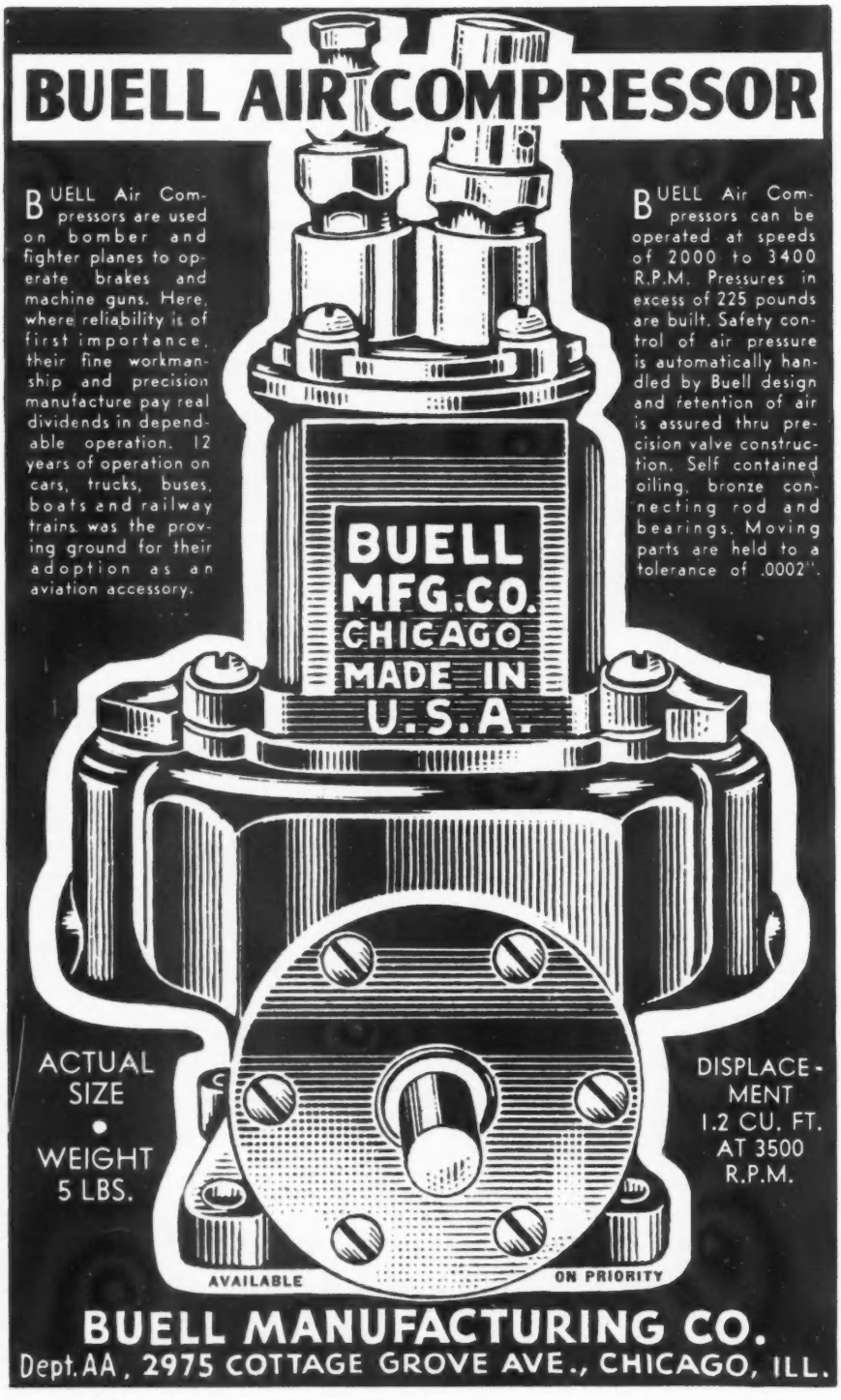
Difficulty in producing such a large forging having the necessary uniform hardness has previously made production of this size cutter almost impossible. Plan-O-Mill engineers are said to have solved the problem by segmenting the cutter. This has the further advantage of providing a spiral gash cutting action for smoother milling and improved work finish, with straight gash grinding. In threading gun tubes these cutters are used for rough, semi-finish, and finish cuts.

AN 1100-ton self-contained hydraulic forging press, equipped with a 35-ton ejector and a sliding die table, is being offered by the E. W. Bliss Company, Brooklyn, New York. It is electrically controlled and properly interlocked by means of the control so that the press, die slide, and ejector operations can occur only when the different actions are in their proper positions.

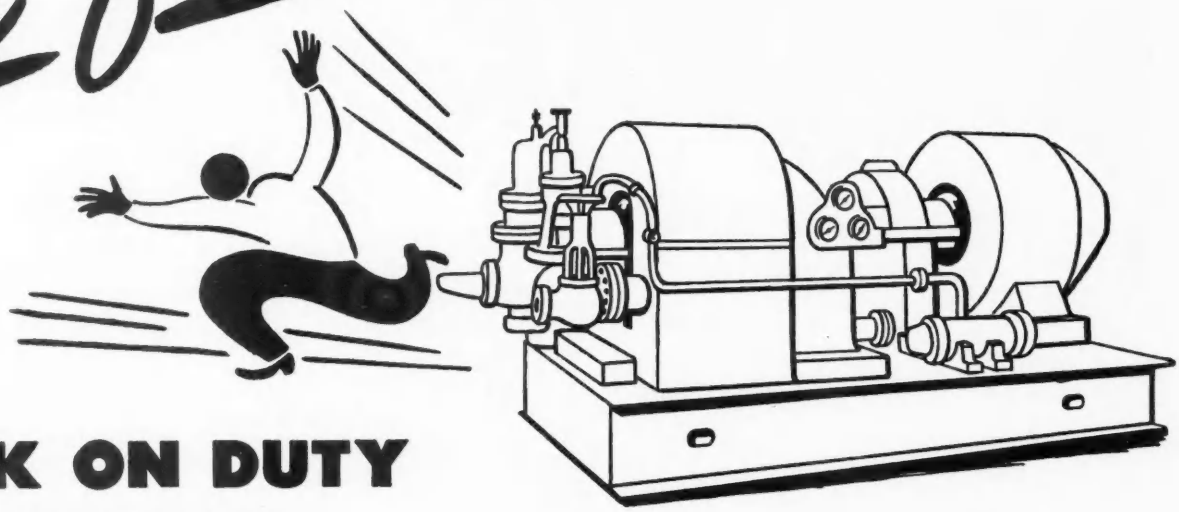
The 150 hp pumping unit installed on this press permits speeds as follows:



Bliss 1100-ton Hydraulic Forging Press


BUELL AIR COMPRESSOR
BUELL Air Compressors are used on bomber and fighter planes to operate brakes and machine guns. Here, where reliability is of first importance, their fine workmanship and precision manufacture pay real dividends in dependable operation. 12 years of operation on cars, trucks, buses, boats and railway trains was the proving ground for their adoption as an aviation accessory.
BUELL Air Compressors can be operated at speeds of 2000 to 3400 R.P.M. Pressures in excess of 225 pounds are built. Safety control of air pressure is automatically handled by Buell design and retention of air is assured thru precision valve construction. Self contained oiling, bronze connecting rod and bearings. Moving parts are held to a tolerance of .0002".
BUELL MFG. CO. CHICAGO MADE IN U.S.A.
ACTUAL SIZE • WEIGHT 5 LBS.
DISPLACEMENT 1.2 CU. FT. AT 3500 R.P.M.
AVAILABLE ON PRIORITY
BUELL MANUFACTURING CO.
Dept. AA, 2975 COTTAGE GROVE AVE., CHICAGO, ILL.

on fire Friday



BACK ON DUTY MONDAY..

FRIDAY NOON--1,000 KW TURBINE-DRIVEN GENERATOR FAILED AND FIELD CAUGHT FIRE. FIELD REMOVED AND DELIVERED TO WESTINGHOUSE DISTRICT MANUFACTURING AND REPAIR PLANT AT 10 P. M. FRIDAY. SHIELDS PULLED, NEW LEADS INSTALLED, BURNED INSULATION REPLACED. UNIT BACK ON JOB IN WAR-BUSY LUMBER MILL AT 6:30 A. M. MONDAY--IN TIME FOR START OF WEEKLY SHIFT.

Westinghouse

DISTRICT MANUFACTURING AND REPAIR

J-90490

IF **THE EQUIPMENT NEEDING REPAIR IS VITAL TO THE WAR EFFORT . . . PHONE THE NEAREST OFFICE OF WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY FOR**

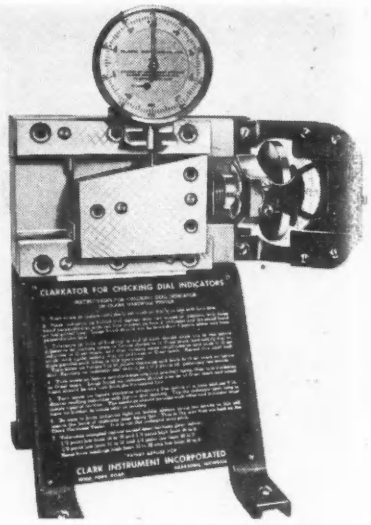
EMERGENCY SERVICE

33 M & R PLANTS . . . ONE NEAR YOU!

quick advance—750 in. per min., pressing—37 in. per min., return—725 in. per min. Four methods of operation are provided for the main slide; semi-automatic cyclic operation, full automatic operation, jogging control by means of a drum type switch, and inching control by means of a push button. Sequence on the first and second methods may include operation of the die slide and ejector.

A DEVICE called the "Clarkator," for checking the accuracy of dial indicators has been brought out by Clark Instrument Inc., Dearborn, Mich. It employs the sine bar principle, checking against the tangent of the angle. The indicator to be tested is mounted on the top of the Clarkator with its spindle resting on a lapped angle block, which is advanced or retracted by a screw. After clamping the indicator in position so that its zero reading coincides with the dial face on the Clarkator, the screw is revolved in either direction to check other indicator readings. Reading of the Clarkator dial is by means of a mirror, enabling it to be seen together with the indicator.

The Clarkator is said to be suitable for receiving and periodic inspection both of the standard direct reading indicator and the reversed reading indicator used on Rockwell hardness testers. The front angle is used when checking standard indicators, each revolution of the screw equalling .020 in., and each point on the dial .0002 in. The back angle provides a direct method of checking hardness tester indicators, each revolution of the screw equalling .01962 in.



The Clarkator

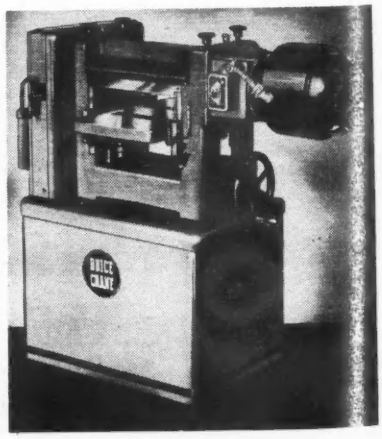
A 12 IN. by 4 in. thickness planer, which is said to turn out work as fine as larger machines, has been produced by Boice-Crane Company, Toledo, Ohio. It is suitable for use in aircraft plants, especially those producing plywood ships, boat yards, and war plants producing items ranging from splints to truck bodies.

The Boice-Crane machine planes all varieties of woods down to veneer-like thickness, ready to finish without sanding, and stock as short as 6½ in.

Large gears and ball thrust bearings and oversize table-lifting screws are used. Two idler rolls mounted on adjustible journals make for steady powerful feed. There is no clutch. Feed pressure is always within complete control. The feed can be stopped instantly without stopping the power source.

Bench or floor type models are offered

(*Turn to page 98, please*)



Boice-Crane Thickness Planer

48-HOUR DELIVERY . . .

. . on 75% of standard MALE THREAD GAGES!

For you manufacturers, both small and large, who are worried over uncertain delivery promises on your Male Thread Gages, why not let us quote on your gage requirements today, because we carry 75% of standards in stock ready for delivery.

A combination of a new plant, modern equipment and experienced workmen has made it possible for PERFEX to make this 48-hour delivery promise of 75% of standard male thread gages.

Yes, it's the "know how" that enables PERFEX to make and keep delivery promises and it's the "know how" that enables PERFEX to manufacture the finest and most accurate gages.

There is a 3 to 5-week delivery promise on all other PERFEX standard size gages. For a complete description of our gage line wire or write our sales department today!

PERFEX'S 4 Pitch Left-Hand Thread Gage.

There is no obligation on your part to have our representative call on you, merely write us—or if you wish, send us specifications and blue prints and we will see that a quotation is immediately forwarded to you.

PERFEX manufactures Thread, Plug, Radius, Contour, Profile, Flush Pin, Adjustable Snap, Solid Snap, etc.

ACCURACY PERFEX OUR CREED

PERFEX GAGE and TOOL CO.
3601 GAYLORD DETROIT, MICHIGAN

There's Stamina and Performance

with

McQUAY-NORRIS

ALTINIZED

PISTON RINGS

PISTONS..PINS..
HARDENED & GROUND PARTS

McQuay-Norris, a pioneer manufacturer of parts in the automotive field, is devoting itself in increasing measure to the aviation industry. Our Aircraft Division projects the McQuay-Norris policy of clinical research into this important field with the result that we are continually adding to available parts, technical assistance and research experience. Your inquiries are invited.

PARTS FOR AIRCRAFT ENGINES

Piston Rings
Oil Sealing Rings
Supercharger Rings
Carburetor Parts
Machined Aluminum Pistons
Piston Pins
Counterweight Cheek Pins
Machined Magnesium Parts
Cylinder Hold Down Nuts
Hardened and Ground Parts

PARTS FOR PROPELLER ASSEMBLY

Machined Magnesium Parts
Piston Rings

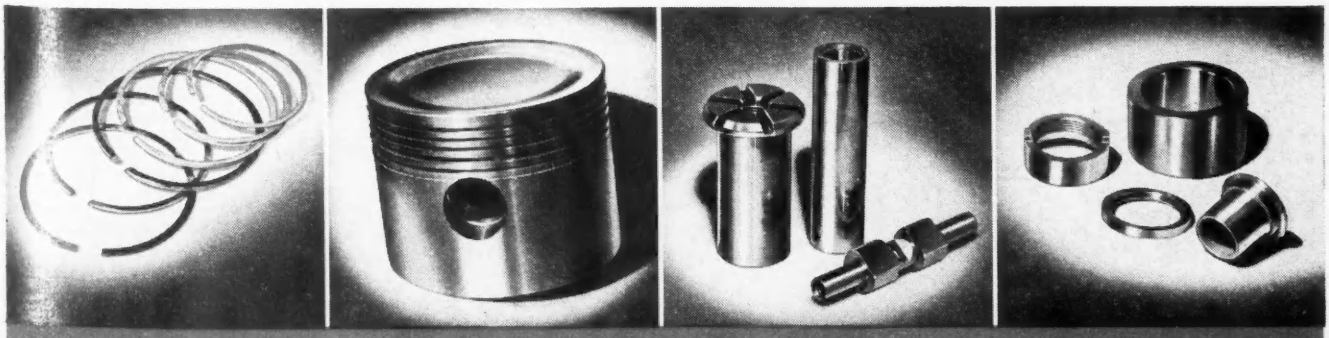
EQUIPMENT FOR MAINTENANCE OF AIRCRAFT

Pistons for Oxygen Compressor
Piston Rings for Oxygen Compressor
Pins for Oxygen Compressor
Pistons for Air Compressor
Pins for Air Compressor
Piston Rings for Air Compressor

LANDING GEAR PARTS

Machined Aluminum Pistons
Piston Rings
Hardened and Ground Parts

PRECISION WORKERS IN IRON, STEEL, ALUMINUM, BRONZE, MAGNESIUM



McQUAY-NORRIS MFG. CO. (AIRCRAFT DIVISION), ST. LOUIS, U.S.A.

CANADIAN PLANT, TORONTO, ONTARIO

GIVES INSTANT RESPONSE ON ANYTHING THAT ROLLS, FLOATS OR FLIES

Several years ago General Controls engineers set out to design a line of valves to function on aircraft, trucks, tractors or any type of moving equipment or machinery subject to severe vibration.

★ When this line of valves was perfected it was given the name ***hi-g*** because of its ability to function in any position, regardless of vibration, change of motion or acceleration as indicated by increases in the "g" factor. Being light in weight, ***hi-g*** proved especially effective in airplane operations such as propeller feathering, wing flap and landing gear, anti-icing and temperature controls.

As America's war production swung into high, our plant facilities were turned over to the production of ***hi-g*** controls for use in aircraft manufacture. Today, ***hi-g*** plays a vital part in the construction of bomber and fighter planes. We are grateful for the confidence placed in our products by the aviation industry and proud of the opportunity to be of service during the present emergency.

GENERAL CONTROLS

Wartime Manufacturers of Electro-Magnetic and Temperature Controls for Aircraft • Peacetime Producers of Automatic Pressure, Temperature, and Flow Controls

801 ALLEN AVENUE, GLENDALE 1, CALIFORNIA

BOSTON • NEW YORK • PHILADELPHIA • DETROIT
CHICAGO • CLEVELAND • DALLAS • DENVER • SAN FRANCISCO

Aero Body Formulates Policies for War Contract Problems

(*Continued from page* 48)

A. Callery, vice-president of Consolidated Vultee Aircraft Corp., on behalf of the West Coast manufacturers, who, in both cases, stressed the need for building up post-war financial reserves.

On the policy to be adopted by the Government, and the mechanism for carrying it out, in connection with the disposal of the immense number of Government-owned airplanes existing after the war, the committee recommended that the technical and industrial services of the industry be made available to the Government to assist in the solution of this problem. It also urged that studies of the situation give due consideration to the national defense, the public welfare, and the necessary protection of the industry and its employes.

It is estimated that 90 per cent of the airplane plant facilities of the country are now owned by the Government and how they are to be handled at the end of the war presents a complex problem. The committee recommended cooperation with the Government in developing legislation for the post-war disposal of defense plant facilities so as to protect the interest of both the Government, the economy of the country as a whole, and in particular the maintenance of as high a degree of employment as possible in the aeronautical industry.

Regarding the problem of war contract termination the committee urged a broad declaration of national policy in connection with the settlement of war contract termination claims for a guide to contrasting officers in settling, and to Federal Courts and Boards in rendering decisions on such claims. Other important recommendations were:

Legislation providing for uniform termination procedure which will be applicable both to existing and future prime contracts and subcontracts.

Mandatory advance payments up to 90 per cent of the cancellation and termination claims without any interest charge.

Authority for contractor, acting in good faith, to make binding settlement with a subcontractor for cancellation charges in an amount up to $25,000.

Legislation providing for governmental assumption at the option of the subcontractor of all subcontracts where claims for cancellation and termination are in excess of $25,000, including provision for advance payments by the government to the subcontractor up to 90 per cent of his certified claim.

Broad legislative authority for reimbursement of termination expenses which will cover such items as leases extending over a longer period than the time required for performance of the contract, and outstanding commitments which are not specifically applicable to any one contract, and for other costs incurred in connection with war contracts.

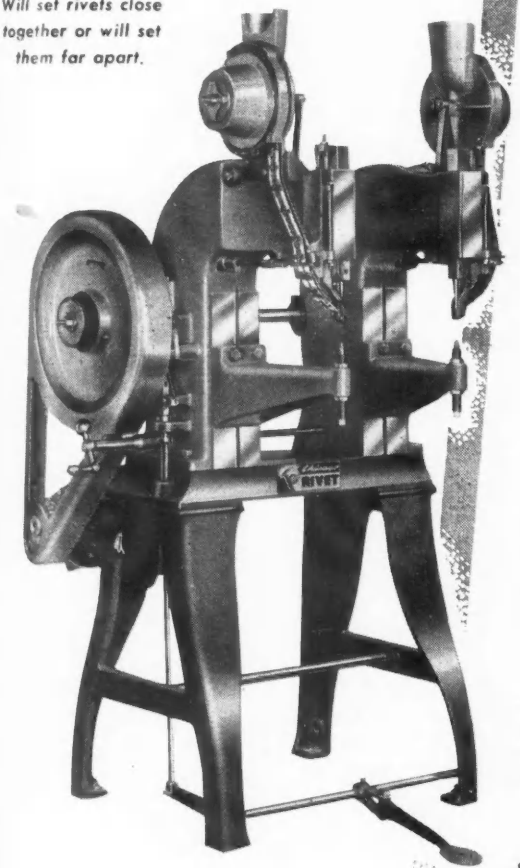
Legislation legalizing informal orders and contracts similar to the Dent Act passed after the last war.

Legislation recognizing termination expenses of subcontractors as reimbursable costs.

Legislation providing that upon the termination of all, or substantially all, wartime contracts, there be declared a moratorium on payments due to the Government under all renegotiation agreements until such time as the Government has made settlement in full of all termination and cancellation claims.

In the export field Federal legislation or regulation should be avoided that would effect uneconomic distribution abroad of surplus or Lend-Lease aeronautical products of U. S. manufacture, the committee stated, and that liquidation of this phase of the war effort should be accomplished to safeguard against anything in the nature of "dumping." It recommended that export licensing requirements, by whatever agency of the Federal Government administered, be abolished or that the regulations under the Munitions Control Act be modified to a point where they no longer will be a trade deterrent. Full consideration was advocated for aeronautical exports in the future negotiation of Reciprocal Trade Agreements to the end that the existing low tariff rates be bound or "frozen" and that where such rates are considered too high by the American industry substantial reductions be sought.

FASTEN 'EM FASTER



Will set rivets close together or will set them far apart.

All Chicago Automatic Rivet Setters can be retooled for setting solid aircraft rivets.

USE Chicago AUTOMATIC MULTIPLE RIVET SETTERS

with adjustable centers

"Fasten 'em faster . . . faster yet!" That's the war cry on America's production lines. That's why Chicago Automatic Multiple Rivet Setters are taking over more and more "hot spots" on the fastening front. On assemblies fastening wood to wood, metal to metal, leather to leather, composition to composition, or any combination of these materials . . . Chicago Automatic Multiple Rivet Setters will multiply output and trim down unit costs.

FASTER . . SETS TWO RIVETS AT ONCE . . MORE VERSATILE

The Chicago Automatic Multiple Rivet Setter actually sorts, feeds, inserts and clinches two tubular or split rivets with each trip on its foot pedal. Its twin riveters may be operated in unison, setting two rivets simultaneously, or only one of the twin units may be used. Its riveting centers are easily adjustable in or out with a simple ball crank. Its anvil horns may be raised or lowered to meet a job's requirements.

FREE CONSULTING SERVICE!

Send a sample of your riveted assembly, or a blueprint, to Chicago Rivet. Our engineers will apply all their riveting knowledge and experience to a study of your assembly and recommend possible ways of increasing your output and decreasing your unit cost. No charge, no obligation for this expert analysis. Send in your samples or blueprints today.

Chicago Rivet

CHICAGO RIVET & MACHINE CO.
9616 W. Jackson Blvd., Bellwood, Ill. (CHICAGO SUBURB)

Engineering BDV Production of Flying Fortresses

(*Continued from page* 21)

shipped to each of the Douglas and Vega companies. These airplanes were broken down into the major components, though each component was complete to the usual fly-away degree, including all equipment and installations.

Hammer Formed Parts

To insure that all hammer formed parts would be structurally and aerodynamically identical between the three companies, information on drop hammer dies was transmitted by making duplicate plaster patterns of these dies. Plaster pattern workers were supplied by Vega, and these men prepared duplicate plasters on each die for both the Douglas and Vega companies. This work was done in Seattle to avoid the risk of possible breakage of the original Boeing plaster patterns if they were to be shipped to California.

Master Gage Duplication

The duplication of master gages was another problem requiring careful coordination. These gages are used to establish and to periodically check the control points in the jigs for the major components of the airplane.

Since the original master gages were in use at Boeing for periodic checking and for the building of additional jigs, it was necessary to work out a detailed schedule for reproducing them in order to provide a duplicate set for Vega and Douglas and for such individual gages as were needed by the major subcontractors for the program.

In certain cases, the two duplicates were made by Boeing for the other companies. In other cases, the master gage was shipped to California and either Douglas or Vega built from it a duplicate for themselves and for the other company, and the master gage was returned to Boeing. Through a carefully controlled schedule, the information contained in the approximately 80 master gages was in this manner transferred to the Douglas and Vega companies.

By common agreement, the master gage at Boeing is considered the final word in the dimensions which it defines. In the case of discrepancies in the fit of components built by Douglas, Vega, or the subcontractors, they are first checked against the duplicate master gages. If this does not clear up the discrepancy, the duplicate master is then checked against the original master gage at Boeing. The efficacy of this phase of the program is attested by the fact that a landing gear may be removed from a Vega- or Douglas-built B-17F and installed directly on a Boeing-built Flying Fortress. In accordance with an interchangeability list established by the BDV Committee, the other major components of the airplane may be similarly interchanged.

Aside from the obvious service advantage to the Army Air Forces, this degree of interchangeability has been a factor in the rapid and smooth acceleration of B-17F production. The interchangeability of components has enabled the three companies to exchange with each other and thus remedy shortages that were inevitable during the early phase of the program.

Military Necessity Change Coordination

The first group of military necessity design changes descended upon the B-17 in the early part of the program. In order that these changes would be reflected in the original body of data, Douglas and Vega volunteered to send a group of designers to Seattle to work in the Boeing design groups and aid the engineering of these changes. As a result of this cooperative means of expediting engineering, this group of changes was completed within the

Governors
for ALL PURPOSES

Increased production in many fields, to meet present demands for defense and offense, has created delivery problems with which some suppliers have been unable to cope.

The war program has stepped up our production repeatedly . . . for Hoof Governors will be found on such diversified equipment as trucks, ambulances, fire fighting equipment, arc welders, air compressors, tractors, loaders, saw mills, feed mills, gasoline driven locomotives.

Whatever your equipment may be . . . if it is controlled by a governor, we should be a source of supply. Complete engineering facilities to furnish just what you need; production facilities for getting it to you on schedule . . . and at the right price.

HOOF PRODUCTS COMPANY, CHICAGO, U. S. A.

HOOF FULL POWER GOVERNORS

RUGGED ACCURATE BED . .
Another Finer Feature of Logan Lathes

The accuracy you need for precision work is yours in a Logan Lathe, even after long continuous use. For Logan combines solid strength and Nth degree accuracy in every Logan Lathe bed. Extra heavy ribbed and warp-free, the Logan bed is machined from the finest special analysis castings obtainable. Its V ways and flat ways are precision ground to an accuracy of within .001 of an inch from end to end. This fine construction, usually found only in the highest priced lathes, is another reason why alert production men are depending more and more on Logan Lathes for low cost production of small parts.

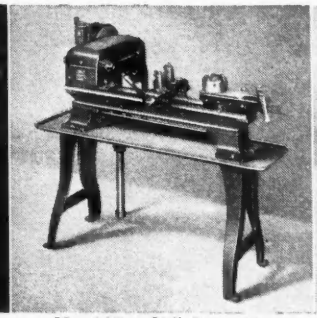
Write today for catalog sheets giving complete specifications on all models of Logan Lathes . . . Quick Change Gear Types . . . Manufacturing Turret Lathes . . . Hand Screw Machines . . . Floor Model Back Geared Screw Cutting Lathes . . . Bench Model Back Geared Screw Cutting Lathes.

LOGAN ENGINEERING COMPANY
Chicago, Illinois

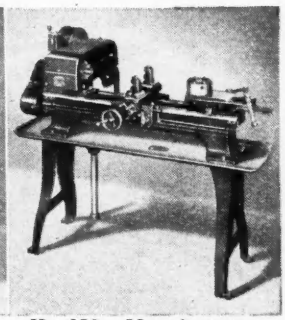
BRIEF SPECIFICATIONS

Swing over bed, 10½" . . . bed length, 43⅛" . . . spindle hole, 25/32" . . . capacity, ⅝" with push type collet . . . 6-position automatic indexing turret . . . stroke of turret, 4¼" . . . 12 spindle speeds from 30 to 1450 r.p.m. . . . all moving parts protected by ball bearings or self-lubricating bronze bearings.

Logan . . . A NAME TO REMEMBER WHEN YOU THINK OF LATHES



No. 830—⅝" Capacity Hand Screw Machine



No. 850—Manufacturing Turret Lathe

original release schedule and were represented in the engineering data as it was first received by the California companies.

This group of changes was a mere forerunner of things to come in this connection. At that early date in the program, the concept of maintaining the superiority of an aircraft design through its production life by constant revision according to the dictates of combat experience had not reached the general level of acceptance that is prevalent today.

At the very beginning of the program there was even some talk of "freezing the design" in order to make the three-way production program possible. This feeling was short-lived, however, for as the B-17 began to receive its baptism of firm under actual combat conditions, the necessity for varying the armament and equipment of the airplane to meet these conditions became clear.

As an example, celestial navigation equipment became an immediate necessity when B-17's began operating in areas of radio silence. Frontal attack methods developed by the enemy forced the immediate installation of additional guns to increase the fire power in the forward area. Thus began a steady stream of design changes that has continued at an average of slightly better than one a day for the last two years.

In order to permit the Douglas and Vega companies to incorporate these changes as near to simultaneously with Boeing as possible, special means were devised. Since all engineering on changes is accomplished by Boeing, a priority list and progress report is prepared weekly by Boeing Engineering. This listing is approved by the BDV Committee and coordinated when necessary with the Materiel Command. The list is furnished to the Douglas and Vega companies to provide them with information on the exact status of each change at any time and its relative importance.

In the average aircraft factory producing its own design, the rapid incorporation of design changes it, to a large degree, contingent upon cooperation between Engineering and tooling and production departments during the design stages of a change. This cooperation enables the manufacturing departments to "get set" for the change and plan for its handling prior to its release from Engineering.

Due to the geographical distance between the Boeing Engineering Department in Seattle and the Douglas and Vega production and tooling departments in California, this usual type of liaison was not physically possible. To substitute for this normal contact, the BDV Committee arranged for Boeing to supply copies of design proposal information to Douglas and Vega at the same time the proposal is submitted to the AAF Materiel Command.

Information as to the effect on tooling and material in the form of a descriptive letter is furnished at the same time. This information is supplied through the Seattle offices of the Douglas and Vega companies whose personnel maintain close contact with the design changes as they progress through Boeing Engineering, and are thus able to provide the California plants with answers to further questions.

The successful operation of this arrangement has been a large factor in getting military necessity changes incorporated in the Douglas and Vega production lines with the least possible delay even though the changes were engineered at a great distance.

Engineering Design Responsibility

Throughout its life, the BDV program has adhered to the original premise that Boeing is responsible for all engineering design. This policy has resulted in airplanes from each of the three plants maintaining a common identity. This policy has undoubtedly resulted in the three companies being able to incorporate the multitude of military necessity changes at a more rapid rate, even though, at times, the Douglas and Vega companies might have temporarily eased their production problems by incorporating certain changes in accordance with their own design ideas.

SHEETS, EXTRUSIONS AND MOLDED PARTS

★ America, shut off from *foreign* rubber, is creating it out of the vats of ingenious home industries. It is only natural that while we synthesize it chemically atom by atom we should build into it particular qualities dictated by the end use.

Acadia Synthetic Products is working hand in hand with aircraft designers and manufacturers, producing sheets and shapes of synthetic rubber for packing, diaphragms, grommets, ring seals, bushings, chafing strips, etc. Each part is particularly qualified for the service it will see.

Let Acadia engineers work with you on applications to fit your products.

Write us for further information.

Acadia Synthetic Products Division

WESTERN FELT WORKS

4035-4117 Ogden Ave., Chicago 23, Ill.

420 Stephenson Bldg., Detroit, Mich.

BRANCH OFFICES IN ALL PRINCIPAL CITIES

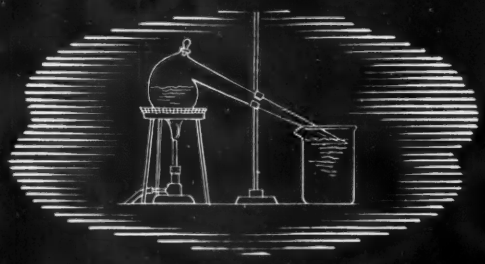
DIVISION OF WESTERN FELT WORKS

ACADIA Synthetic PRODUCTS

Processors of Synthetic Rubber and Plastics

Sheets • Extrusions

Molded Parts



Lessons From The War

From our wartime experience we can say this: When peace comes, Americans will enjoy the comfort and convenience of many strange new devices which are today devoted to military purposes. They will not only extend our span of life but also make it pleasanter in many ways. The 4-plant facilities of The Weatherhead Company are prepared to help you build these peacetime products just as we've helped build America's cars, planes and refrigerators in the past. We offer you better designing than ever, much lowered production costs and a highly efficient service organization.

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO
Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

If the companies had not held to the common engineering design, it is readily apparent that a pyramiding process would have resulted. The next change falling in that area would by necessity of conformance have to be re-engineered by Douglas and Vega to fit the previous change. Obviously the airplanes would become increasingly divergent in their identity and an ever-increasing amount of independent engineering design work would have to be done by Douglas and Vega.

To permit adaptation of their factory methods, Douglas and Vega have been allowed to make small "facilitate production" changes. The governing factor of these changes has been that they cannot affect strength, weight, or interchangeability. This restriction has limited such changes to the substitution of spotwelding for riveting, of press formed parts for built-up riveted fabrication and vice versa, of material substitution, and others of a similar nature.

The steadfast maintenance of Boeing as the responsible design contractor on the BDV program has resulted in a minimum of confusion over Government and company inspection policies in the Douglas and Vega plants. When a part is questioned as to its conformance to individual company practices or AAF specifications, the standard of acceptability is based entirely on whether or not it conforms to the Boeing data. If it does, the part is accepted and used without further question.

The basic policy established in the beginning of the program by the BDV Committee has eliminated many arguments and controversies that would have been inevitable in two plants building an airplane that was strange to them in its basic structural design, and building it from a body of data that was originated around unfamiliar and individual systems of another company.

The significance of the latter factor is not to be minimized. It is well illustrated by the fact that the BDV Committee found it necessary as one of its first tasks to prepare a cross-index of Boeing, Douglas, and Vega terms and establish a standard BDV nomenclature for the many commonly used forms, practices, and designations used by Engineering, Tooling, and Procurement.

It is to the credit of the BDV program that the Douglas and Vega companies did not find it necessary to redraw the airplane to conform to their individual systems as has often been the case in the industry where one manufacturer has built another manufacturer's design. Since both Douglas and Vega are also producing their own models along with the B-17, this means that two different systems are handled side by side throughout engineering release, production planning, tool design, production control, material control, purchasing, and outside production.

At the present time, the Douglas and Vega factories are handling the Boeing drawing system with a degree of facility that closely approaches the handling of their individual systems on models of their own design. This has been made possible through determined effort and close liaison with Boeing during a period of educating personnel in the workings of the Boeing system. Aside from the large amount of critical engineering time saved by using the Boeing drawings directly, it has undoubtedly resulted in the two factories being able to produce B-17's at a substantially earlier date than would have otherwise been the case.

Throughout the entire BDV program, there has been in evidence a ready exchange of "know-how" that has extended far above the contractual obligations. There is a healthy competition as to which company can produce the greatest number of B-17F airplanes per unit of manhours and facilities. However, each company is ready and willing to lend a hand to the others, when able, to alleviate a shortage.

The spirit of cooperation in this endeavor has set a high standard for subsequent and similar programs to follow. The united efforts and concerted action by Boeing, Douglas, Vega and the Materiel Command in surmounting these many technical problems have resulted in the volume of B-17's built by each company being almost double the originally planned production.

FOR RUSH GAUGE DELIVERIES WIRE TURNER TODAY!
RUSH
WE KEEP PROMISES
Turner can now deliver rush orders on their plug, snap, flush pin and built up gauges. To facilitate deliveries we advise that you send blueprints and complete detailed information with your purchase order. For descriptive literature and prices on Turner's complete line of gauges write us today. (On your company stationery, please.)
TURNER BROTHERS
TURNER GAUGE GRINDING COMPANY
2622 HILTON ROAD • • • • FERNDALE, MICH.

DU PONT PROCESSES

TO HELP SOLVE YOUR WARTIME ELECTROPLATING PROBLEMS

"ZINOLYTE"—Bright Zinc deposits directly from baths made up with prepared salts.

"DUROBRITE"—(Formerly called *Du Pont Bright Zinc.*) For production of bright deposits from solutions made up with standard chemicals.

DUCTILE ZINC—Matt white deposits, suitable for deep drawing and sharp bending.

STRAIGHT CYANIDE ZINC—Easily controlled plating solutions for production of fine-grained, rust-proof deposits.

"CADALYTE"—Salts and Maintenance Compound for rapid, efficient production of bright cadmium deposits.

HALOGEN TIN PROCESS—For high-speed plating of strip steel.

STANNATE PROCESS—Practical, economical method for strip steel and general purpose plating.

HIGH SPEED COPPER—For rapid, economical production of heavy, smooth, bright deposits at high current densities.

SULFAMATE LEAD—Solutions easily made up and maintained with prepared salts. Smooth, dense, pore-free coatings of excellent corrosion resistance readily obtained.

SILVER—Heavy coatings . . . adherent and fine-grained, 0.035" or more, can be produced using current densities as high as 100 A/SF or higher.

STANDARD AND SPECIAL CHEMICALS—For Gold, Cadmium, Copper, Chromium, Nickel, Brass, Bronze, Tin, Zinc, Silver and Lead Plating.

One or more of the Du Pont processes listed above may help *you* during these days of rushing wartime production.

Each has been developed by Du Pont to meet specific industrial requirements. Each has provided an economical answer to the electroplating needs of many users.

Du Pont technical men are ready to help you with your particular electroplating problems and in the selection and application of appropriate processes to meet them. E. I. du Pont de Nemours & Co. (Inc.), Electroplating Division, Wilmington, Del.

DU PONT

REG. U. S. PAT. OFF.

ELECTROPLATING

PROCESSES and MATERIALS

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

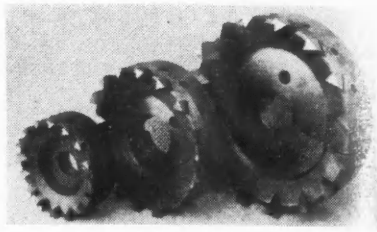
New Production Equipment

(*Continued from page* 88)

in a choice of drives: direct to cutterhead, V-belt electric motor drive, or drive from lineshaft or gasoline engine.

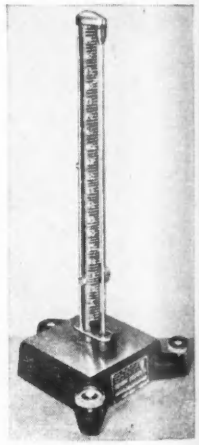
A NEW type of cutter blade, known as the Tri-Bit, has been applied to face milling cutters by Weddell Tools, Inc., Rochester, N. Y. Tri-Bits are triangular shaped adjustable tool bits, each of which are locked in a vee shaped hole in a heat treated cutter body by a single lock screw. The cutter body is tied together all around the blade, as there are no slots in the body. Each Tri-Bit is further backed up by a single adjusting screw, permitting adjustment of the cutter blade for 60 per cent of its length. The face of the cutter body is dished, which in combination with the triangular blade forms a chip space that expands in size away from the cutting edge in direction of chip flow.

Tri-Bit Face Mills are made with three different sizes of Tri-Bits for medium, heavy or extra heavy duty operations. These respectively are for cuts up to ¼, ½ and ¾ in. in depth. Cutters are furnished with high speed steel, cast alloys or carbide tipped Tri-Bits. They are made to standard or special specifications, with any number of Tri-Bits, set at suitable cutting angles for any material.



Tri Bit face milling cutters

PRECISION SCIENTIFIC COMPANY, Chicago, Ill., has acquired the sole manufacturing rights for the Bashore Resiliometer. The instrument measures the resiliency of rubber and extensible plastic compounds by indicating the rebound of a weighted plunger dropped from a predetermined height. It has been found useful in the development of rubber and extensible plastic compounds, for measuring rate and state of cure, for matching competitive compounds, for factory control tests on cured samples of mixed batches, for factory control on uncured samples of master-batches, and for controlling the quality of the finished product without destroying the product.



Bashore Resiliometer

A SPECIAL hydraulic 3-way boring machine has just been designed and built by LeMaire Tool & Mfg. Co., Dearborn, Mich. It was designed to bore and counterbore twelve holes in a cast steel differential and final drive housing.

This part, having a total length of 7 ft, weighs approximately 1200 lbs. It is loaded and bored and back on the floor, completing the cycle, within 30 minutes.

The machine consists of a center head and two end heads. The center head has one spindle carrying a 10½ in. cutter on each side. Each of the

And then, as now, you'll find the Bendix* Drive in at the start

Today, Army half-tracks are clearing out the enemy. Tomorrow, re-designed for civilian use, they will be preparing the ground... making way for vast, new projects. The Bendix Drive . . . that famous starting unit you've always known . . . has been adapted for use on all types of Army vehicles, both large and small. And in the post-war years, too, you can depend on the Bendix Drive to meet successfully any starting requirement that may come along, no matter how complex or revolutionary the change.

The Bendix Drive is an important member of "The Invisible Crew" —precision equipment which more than 30 Bendix plants from coast to coast are speeding to our fighting crews on world battle fronts.

THE INVISIBLE CREW
Precision Equipment by
Bendix Aviation Corporation

*TRADE MARK OF BENDIX AVIATION CORPORATION

ECLIPSE MACHINE DIVISION

Speed ASSEMBLY *Simplify* SWAGING *with* SOCKETYPE* CABLE TERMINALS

PN

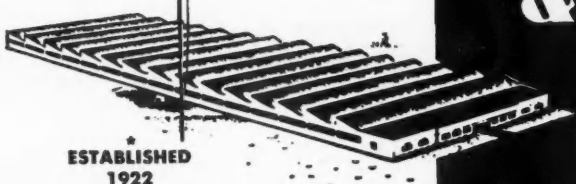
CHOICE OF CABLE SIZES

Other Cable sizes up to ¾"

Approved as interchangeable with B & C types of present standard AN & NAF swaged cable terminals.

Specification sheet and folder available to industry personnel.

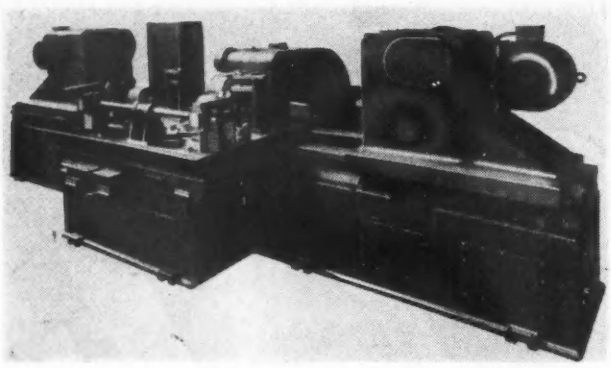
*Pat. Applied for.



ESTABLISHED 1922

POULSEN & NARDON, INC.

LOS ANGELES 11, CALIFORNIA

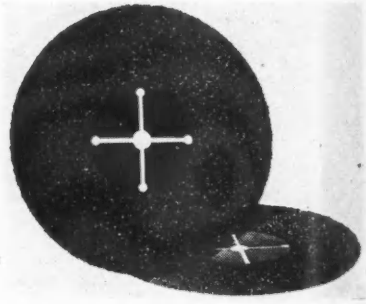


LeMaire 3-way boring machine

end heads has two spindles, one having 3 cutters and the other 2.

The machine is designed to bore and counterbore five holes in each end ranging in size from 5.118 in. to 7.125 in. in diameter while the center head bores two main bearings 10.501 in. in diameter and also sweeps the shoulder bearing seat. All holes are held within .0012 in. tolerance. Both end heads feed while the center head bores one large bearing. When one large bearing is bored, the center head reverses and rapidly advances to a feeding position to bore the large bearing on the opposite side.

A NEW line of Marvel Abrasive Sanding Discs is being manufactured by the Fibre Abrasive Corporation, Chicago, Ill. These discs are made of aluminum oxide grit, bonded with a special heat-resisting resin to a chemically treated super-pliable fibre back. It is claimed that the resin bond will not soften under high speed frictional heat. Marvel Abrasive Sanding Discs are said to be extremely tough and to

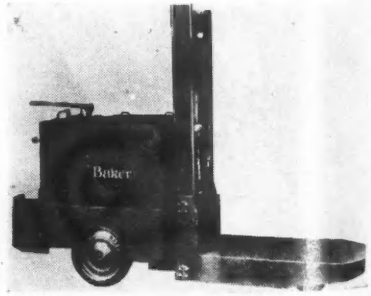


Marvel Abrasive Sanding Discs

require less replacement than the conventional glue bond discs. They can be cleaned and used again. These discs are available in diameters ranging from 6 to 26 inches, and in all grit numbers.

3-Ton Hy-Lift Truck

A 6000 lb capacity Hy-lift truck, known as the Type H-3, has been added to the line offered by The Baker-Raulang Company, Cleveland, Ohio. It is a two-purpose truck which picks up and carries skidded loads, thus fitting



into low-lift truck systems. In addition, it lifts the loads several feet, or higher, and is useful for tiering in warehouses or stockrooms, placing loads on highway trucks or boxcars from the ground level, and many similar jobs.

You want a guide instead of guideposts

when you're thinking Molded Plastics!

You'll find only one direct short-cut to uninterrupted delivery of satisfactory plastic parts—and that's right through the plant of a competent custom molder. The sheer, simple beauty of it is that it's so direct, easy and logical. It's a path to take today—to expedite post-war plans.

Your molder (*taking ourselves as an example*) will:

1. *Cooperate in design and engineering, from the molding and end-use point of view.*

2. *Give sound, disinterested advice on the selection of molding materials—and Mister, there are over 200 basic molding compounds today, most of them divided in-to several special-purpose sub-categories!*

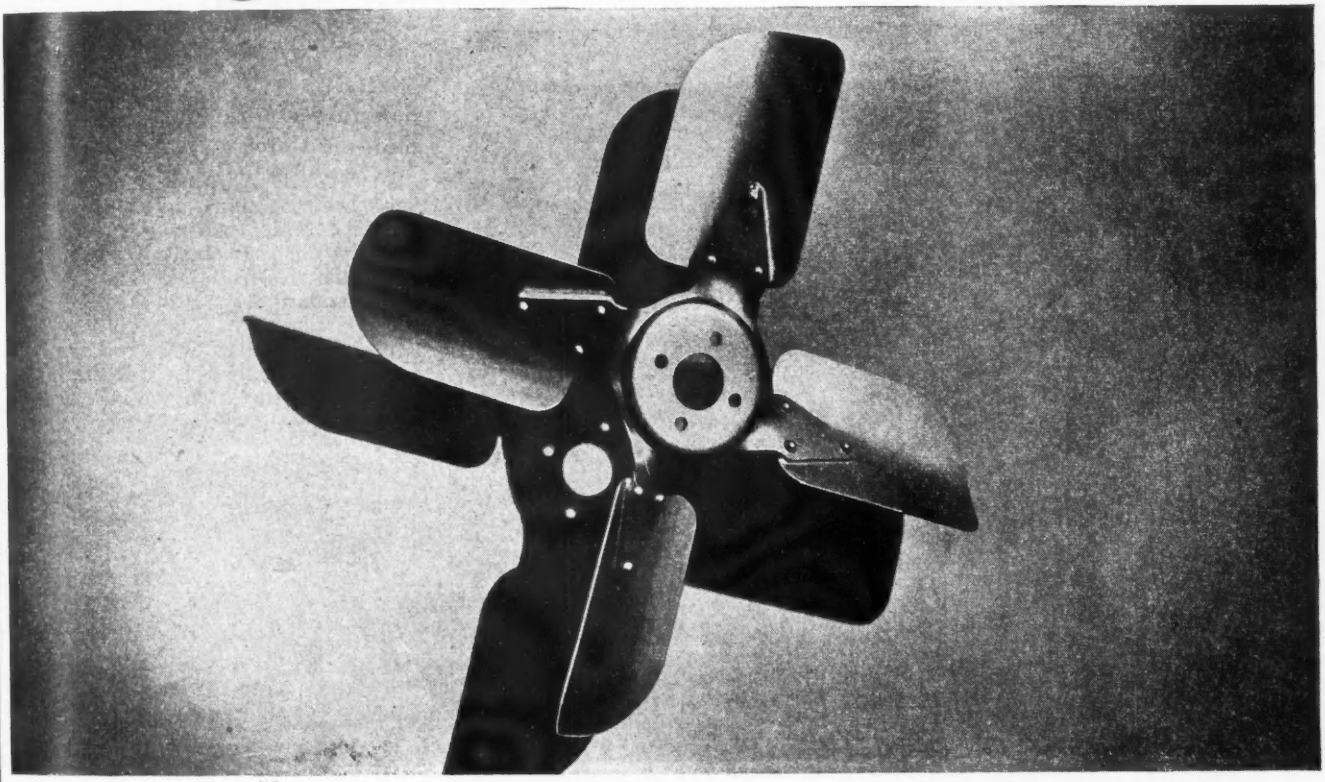
3. *Assume undivided responsibility for every operation—mold-making, molding and finishing (which ought to be parts of one job anyway, unless you enjoy scheduling and "buck-passing" snarls).*

We offer the largest, best equipped molding plant in the Middle West; the ability to assume full responsibility for planning and production and to so mesh our facilities with your manufacturing schedules that you will be assured of soundly-engineered, carefully-produced plastic parts on time. When you start planning that future job, ask for CMPC development engineer!

COMPRESSION, INJECTION AND TRANSFER MOLDING OF ALL PLASTIC MATERIALS

CHICAGO MOLDED PRODUCTS CORPORATION

1039 North Kolmar Avenue, Chicago 51, Illinois



52 PLACES AT ONCE!

. . . the little FAN that's always there

General Marshall says American forces are in 52 places around the world. You'll probably find Jeeps in every one. And on Jeeps—as on tanks, destroyers, trucks and other combat vehicles—you'll find Hayes radiator cooling fans.

Hayes pioneered improved fan blade design and construction—and aims to continue this leadership in war and peace.

HAYES

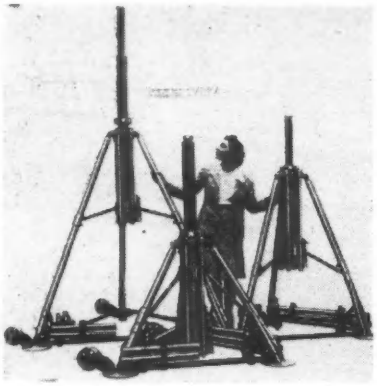
AUTOMOTIVE FANS
AIRCRAFT
WHEELS AND BRAKES

Representatives: Western . . . Airsupply Co., 5959 W. 3rd St., Los Angeles Eastern . . . J. Henry Reisner, Hagerstown, Md.

HAYES INDUSTRIES, INC. Home Office: JACKSON, MICHIGAN, U. S. A.

New Products for Aircraft

(*Continued from page* 46)



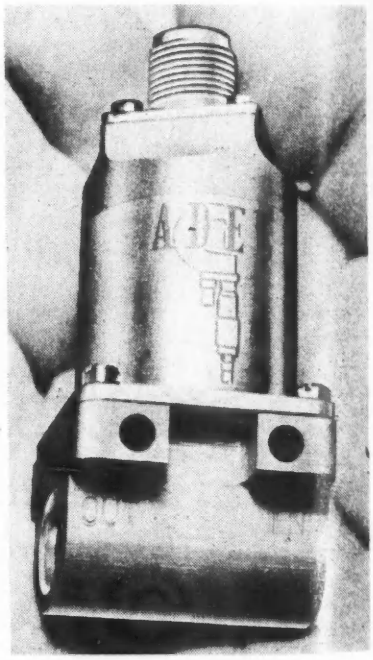
Malabar Aviation Jack showing three height adjustments

Variable Height Aviation Jack

A jack which can be adjusted to a variety of heights is being offered by the Malabar Machine Company, Los Angeles, Cal. It is a Malabar variable height wing or nose jack having interchangeable leg sections, attached to the base, to add 18 in. or 36 in. to the minimum closed height. The basic minimum is offered in 36, 48, and 60-inch models, with hydraulic lifts from 24 in. to 34 in. and 44 in. The 16-inch extensive screw increases the versatility so that total extended vertical heights are 76 in., 98 in., and 120 in. with minimum legs. These jacks are available in capacities of 5, 7½, 12, 17, and 25 tons.

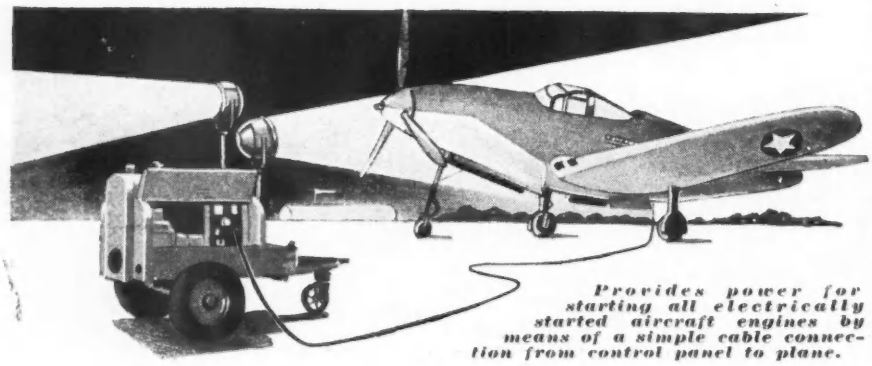
Solenoid Operated Shut-off Valve

A solenoid-operated fluid shut-off valve which weighs only 6.96 oz. has just been brought out by Adel Precision Products Corp., Burbank, Cal. The new valve has a Dural body, is equipped with standard AN 3102-8S-1P receptacle and may be had in port sizes for ⅛ in. pipe thread or ¼ in. tube fittings. Valve is normally closed. Installation may be planned for any operating position. Current draw is .25 amps. at 24 volts dc. Units are available for working pressures of 50 psi and 250 psi.



Adel Solenoid-operated Valve

The solenoid operated hydraulic valve is designed for the remote control of anti-icing fluid flow to the various critical parts of the airplane that are subject to ice accumulations. In addition to its use in the ice protection of propellers, pilots' windshields, bombardier's windows, carburetors, and pilot tubes, it is adaptable for a number of other systems such as heater fuel or oil dilution control, lavatory and drinking



Provides power for starting all electrically started aircraft engines by means of a simple cable connection from control panel to plane.

The Modern Way to Start Planes . . .

NITE-HAWK AERO-STARTER

DEPENDABLE STARTING POWER & LIGHT . . . REGARDLESS OF WEATHER OR TEMPERATURE

The Nite-Hawk Aero-Starter gets planes into the air up to 90% quicker . . . more economically. A PORTABLE, engine-driven power plant, it provides ample cranking power at constant voltage. May be operated continuously at any temperature and is independent of other power sources. Also furnishes power for testing landing gear, checking circuits and wiring, etc. In addition, gives you LIGHT for night operations—all models may be obtained with combinations of searchlights and floodlights. Air compressor attachment for inflating tires also available. Investigate. Wire, write or call.

The Aero-Starter is fully described in our bulletin No. NH12A. Write for it.

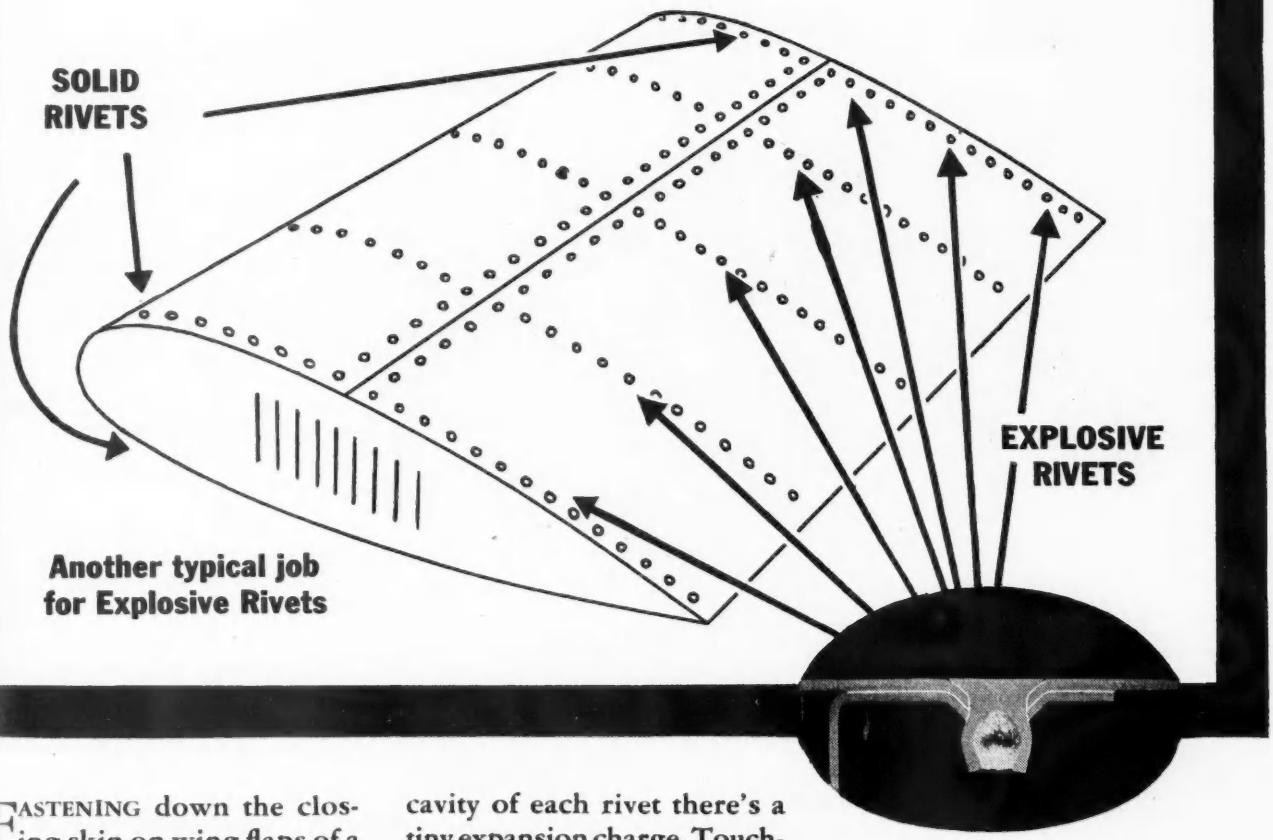
NITE HAWK

Lister-Blackstone

INCORPORATED 1706 SO. 68TH ST., MILWAUKEE 14, WIS.

MFRS. OF PORTABLE NITE-HAWK AERO-STARTERS, SEARCHLIGHT AND FLOODLIGHT UNITS

"SEWING" ON THE CLOSING SKIN OF A WING FLAP...*QUICKLY*



FASTENING down the closing skin on wing flaps of a famous dive bomber is a job for blind riveting. And it's another example of how Du Pont Explosive Rivets are speeding production and helping to provide better, stronger ships.

In one quick, simple operation, one riveter easily sets from 10 to 20 Explosive Rivets per minute. In the shank cavity of each rivet there's a tiny expansion charge. Touching the tip of a Du Pont Riveting Iron to the head of the rivet detonates this charge . . . creating a barrel-shaped blind head that securely sets the rivet in place. And the one-piece solid shank gives the nearest thing to a solid rivet.

When designs call for riveting in hard-to-get-at places . . . look into Explosive Rivets. They save time, cut costs and provide a better job. Call or write for the full story. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., 5494-N Nemours Bldg., Wilmington, Del.—5-236-N General Motors Bldg., Detroit, Mich.—5801-N South Broadway, Los Angeles, Calif.

DU PONT
REG. U. S. PAT. OFF.

EXPLOSIVE RIVETS

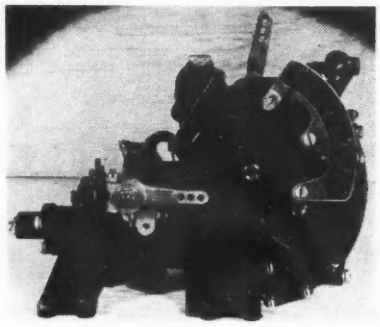
The one-piece blind fastener with a solid shank

water control in commercial transports plus installations in numerous general industrial systems.

Automatic Engine Control

A new model of the Simmonds-Hobson automatic engine control, known as the Mark 46, is now in quantity production at Simmonds Aerocessories, Inc., Long Island City, N. Y., the American manufacturers of this device.

The Simmonds-Hobson Mark 46 is designed as an adjunct to supercharged aircraft engines, and is installed for the purpose of relieving the pilot of manually operating certain cockpit controls, and to provide engine protection through preventing damage as a result of excess manifold pressure. It automatically selects mixture strength as well as manifold pressure, and provides selected settings of the throttle control lever at "take-off," "rated," and "economical cruising boost" positions.



Simmonds-Hobson automatic engine control

Heart of the Mark 46 is the evacuated aneroid, or capsule, an extremely sensitive device which, responding to changes in manifold pressure, moves a servo piston by means of an oil slide valve, which in turn actuates the carburetor throttle control. With the new device the pilot is relieved of the need of adjusting mixture control to give lean mixtures in the cruising range, and adequately rich mixtures are provided if he must suddenly open his throttle from the cruising to the high power range.

Synthetic Rubber Putty

Plastikon putty, manufactured by The B. F. Goodrich Company, Akron, Ohio, and used for glazing and sealing purposes, is now made of synthetic rubber, the company announces. At the present time it is employed chiefly for sealing metal joints in combat equipment.

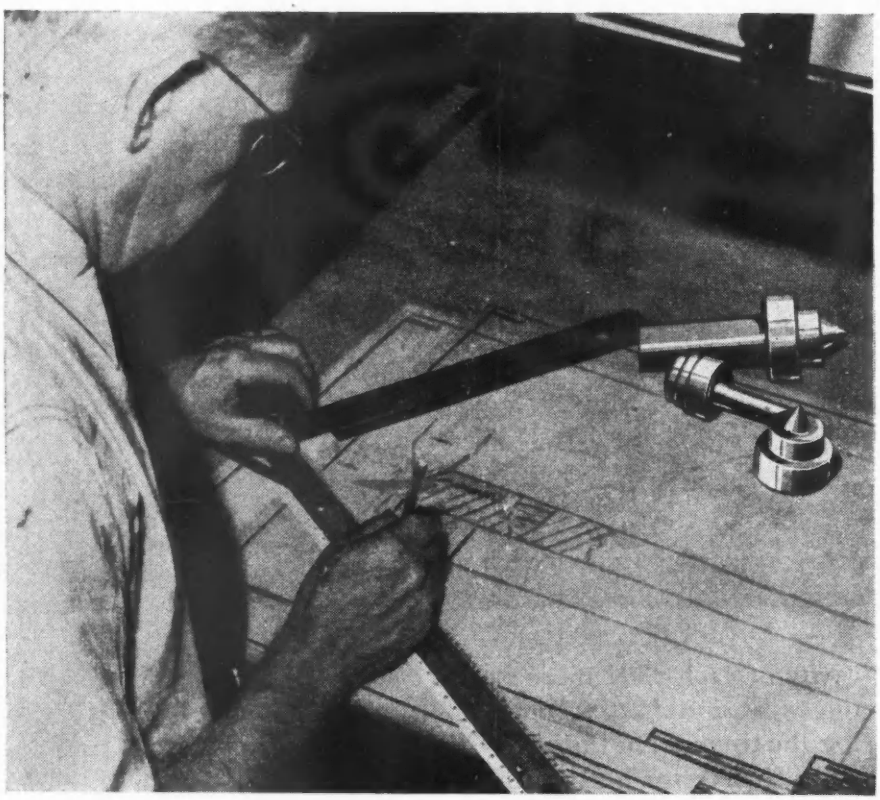
The new putty, in which man-made rubber entirely replaces natural crude rubber formerly used, is superior to the previous product, according to the manufacturer.

Training Course for Carbide Die Users

A special training course for users of carbide dies has been put into operation at Carboloy Company, Inc., Detroit, Mich., according to an announcement by K. R. Beardslee, General Sales Manager, to meet the increased need for trained die-room employees resulting from the vast increase in the use of Carboloy cemented carbide dies in connection with war production.

The course is designed as both a training course for new employees of carbide die users and a "refresher" course for more experienced die service men. For the latter, as well as the former, it serves to acquaint the men with the vast changes and improvements in carbide die servicing methods and equipment made available during the last year or so.

The die training course is designed along lines similar to the training course conducted at Carboloy for carbide cutting tool users in that it embodies actual shop training in the subjects selected. The curriculum moreover is arranged so that each man may select only the subjects of specific interest in connection with his duties at the mill.



ENGINEERED LIVE CENTERS

A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job gets set up with the right Live Center. Standard shanks with Morse taper carried in stock.

STURDIMATIC TOOL COMPANY
5226 THIRD AVE., DETROIT, MICHIGAN
LIVE CENTERS

Buy More Bonds

FOR TODAY AND TOMORROW

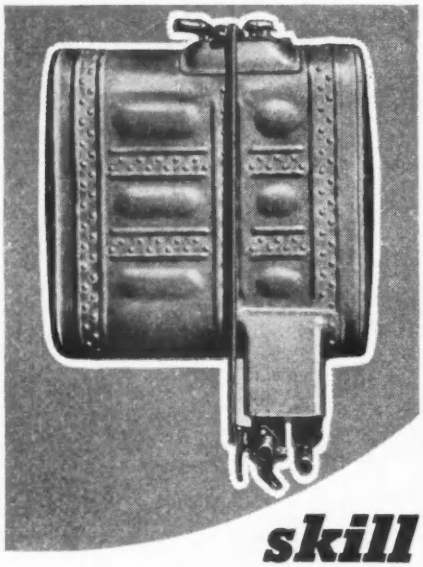
As in War Production Now . . . in the Post War Era ahead AJAX High Speed Forging Presses will be in the forefront in the field of fast, accurate forging production.

While industry is exerting every effort toward the winning of the war, that great day is getting nearer when Post War plans will be put into operation, broader markets will be sought and production advantages will take on a slightly different but extremely important meaning.

On that tomorrow, as today, manufacturers who depend on Ajax Forging Presses for a high output of quality forgings at a consistently low production cost will be in an enviable position.

Write for Bulletin No. 75

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND, OHIO
621 MARQUETTE BUILDING • CHICAGO, ILLINOIS



skill born of experience

Mercury craftsmanship was built up through more than a score of years devoted exclusively to the production of aircraft and aircraft parts; hence wartime demands found us with the equipment, experience and specially trained artisans to deliver vitally needed parts quickly . . . without the delay of plant conversion and the hazard of hastily trained workers.

aluminum tanks

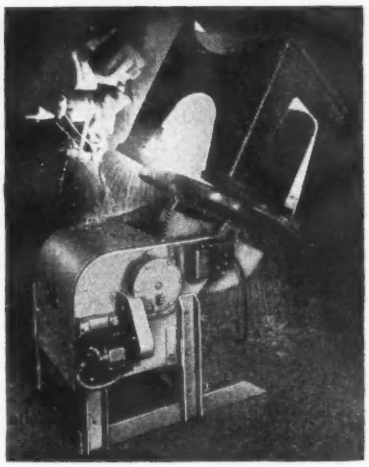
For instance, plant 2 is a completely equipped unit for fabricating and finishing of tanks of any type . . . forming, riveting, welding anodizing, testing and painting . . . progressing smoothly, steadily and swiftly from shining sheet to cartoned shipment.

Aircraft makers know they can depend on Mercury quality and deliveries alike, for tanks, surfaces, parts and accessories.

At the Cradle of Aviation

MERCURY AIRCRAFT INC.
HAMMONDSPORT · NEW YORK

IF YOU WELD . . . You need the DOWNHAND POSITION



Low-cost 500-lb. capacity unit, available either hand-operated or motor-operated

Here's why you need it . . .

Most important, it will greatly increase yo welding production. In many cases, it means th you can do a job in one pass that would requi two, three, or more passes when the weldment ca not be placed in the ideal downhand positio

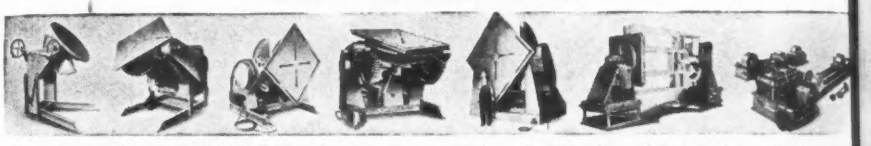
It means smoother, stronger, welds . . . tim saved in both handling and welding . . . rod sa ings . . . and the good will of your welders.

Here's how you can get it . . .

Install Ransome Welding Positioners. Wit this equipment, your welders can shift their wo at will, without crane service, without loss of tim without wasting precious physical energy. Ever seam is just where it should be . . . in position f downhand welding.

There's a unit to fit every welding job. *Wri for full information.*

Units on display at National Wartime Metal Congress . . . October 18 to 22 . . . Room 876, Palmer House, Chicago



Capacities 500-lb. to 40,000-lb., hand and motor-operated . . . Head-stocks and Tail-stocks . . . Turning Roll

Industrial Division · RANSOME MACHINERY COMPANY · Dunellen, New Jersey
Subsidiary of NORTHINGTON PUMP AND MACHINERY CORPORATION

Ransome WELDING POSITIONERS

UAW-CIO Membership

(*Continued from page* 52)

CIO lost NLRB elections at two Thompson Products plants in Cleveland in May, 1942, to the Aircraft Workers' Alliance, an independent union. However, in August, 1943, the NLRB in an intermediate report on the case recommended dissolution of the AWA and cited the company for "unfair labor practices." The company has promised to carry the case to the U. S. Supreme Court, if necessary.

In his report, Thomas said the UAW-CIO has organized more than 250,000 aircraft workers in the last 16 months. This was climaxed recently when the UAW-CIO won by a close margin in the Glenn L. Martin Co. plant at Baltimore in the largest NLRB election since the vote at the Ford Motor Co. in April, 1941. The UAW-CIO received 11,805 votes, or 51 per cent, while 10,901, or 48 per cent voted for "no union." Remainder of the ballots were void. In an earlier election in July, the UAW-CIO received 40 per cent of the votes to 42 per cent for "no union" and 11 per cent for the International Association of Machinists (AFL). The UAW-CIO credited its victory at Martin to the union's success in establishing high wage rates for various classifications at the GM Eastern Aircraft Division plants, one of which is in Baltimore.

The first incentive pay plan on a wide scale was approved recently by the National WLB for the Grumman Aircraft Engineering Corp., Bethpage, L. I. Production of .48 lb of completed aircraft per man-hour of work was set as the base for incentive increases. If output increases 10 per cent, or to .528 lb of aircraft per man-hour, all production employes will receive an incentive payment of 5 per cent of their base wage during the period. Grumman employes also received a 5 cents per hour increase, retroactive to Sept. 1, to compensate for discontinuance of a production quota bonus system already in effect. The Grumman plant is not organized.

In writing the unanimous WLB decision, Dr. G. W. Taylor, WLB vice-chairman, said no incentive plan would be approved in a disputed case and if a union is the recognized bargaining agent, the union's approval must be obtained before WLB will okay it. This would appear to rule out any chance of having General Motors' request for an incentive plan in its UAW-CIO contract approved by the union, as Walter Reuther, head of the GM Dept., is unalterably opposed to any incentive scheme. The GM case was referred to the National WLB Sept. 17 and the board has asked both parties to continue under the present contract, which expired Oct. 5, until a decision is reached.